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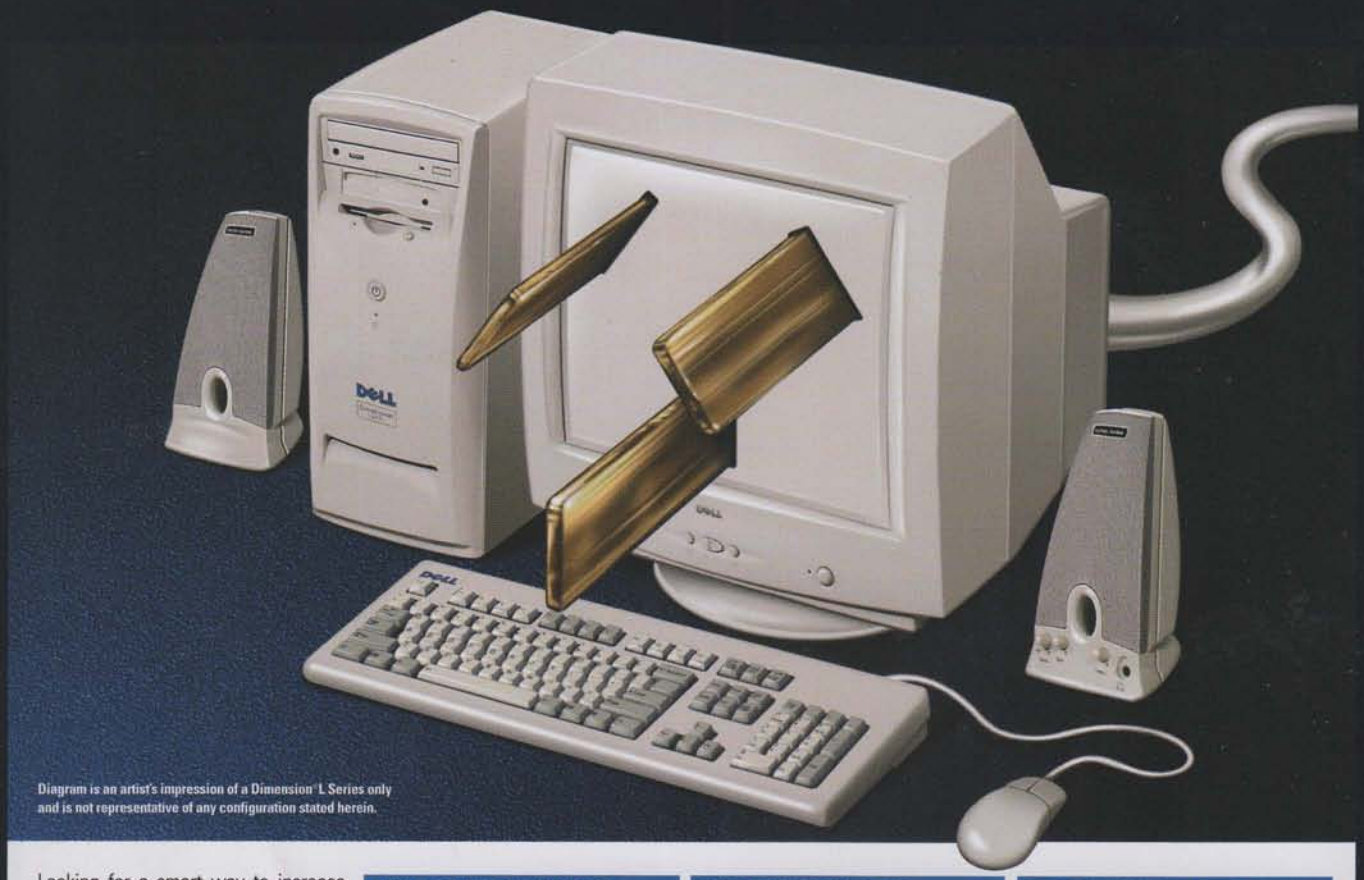

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- 4.3GB[1] Ultra ATA Hard Drive
- Integrated Direct AGP 4MB Dynamic Video Memory
- Creative Labs SoundBlaster 64 Voice PCI Sound Card
- 40X Max[3] Variable EIDE CD-ROM Drive
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- Microsoft® IntelliMouse™
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- Integrated Ultra2/LVD SCSI Controller
- 32X Max[2] Variable EIDE CD-ROM Drive
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DELD0171/APC/GSPREAD

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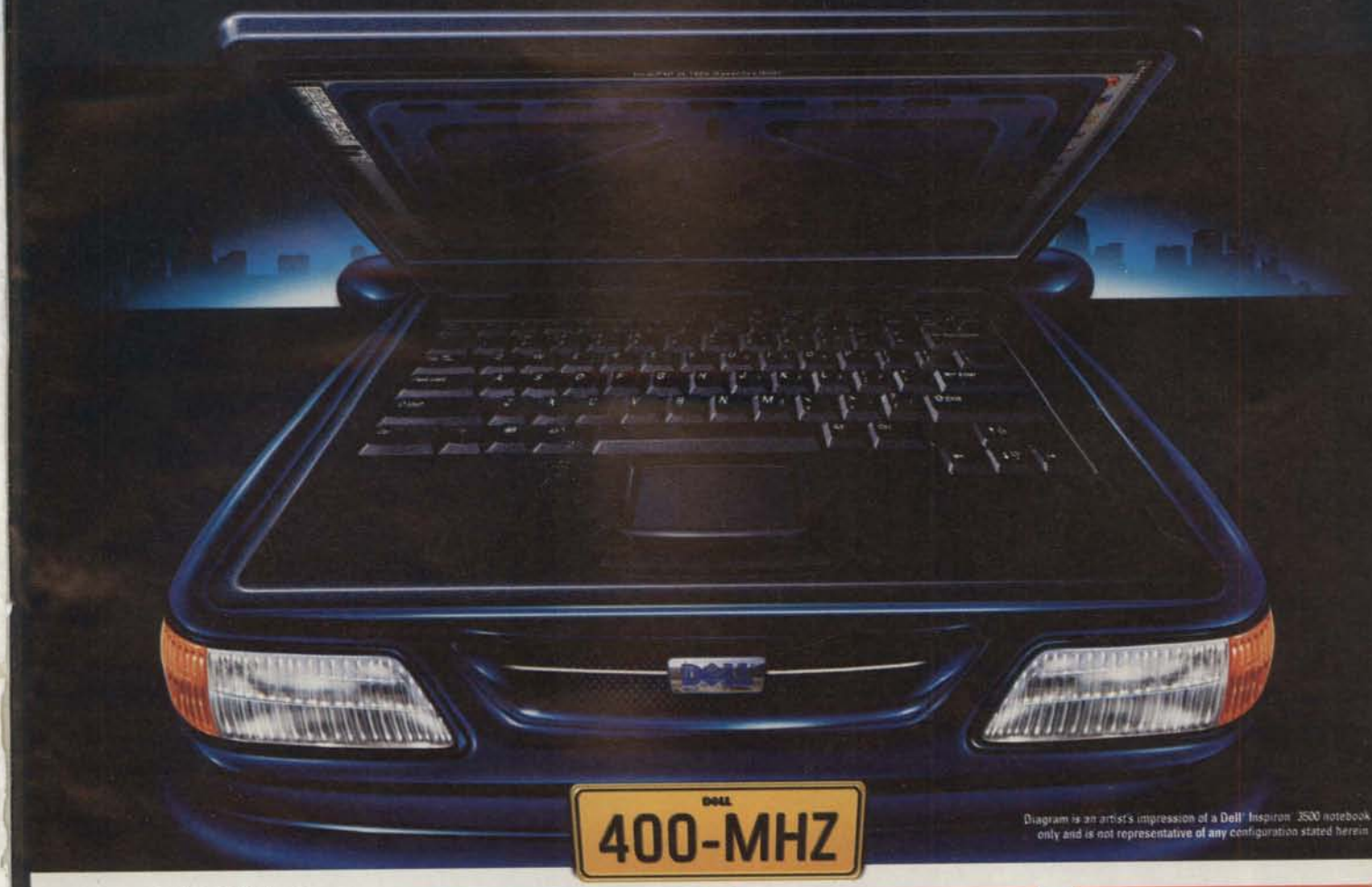

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- 64MB SDRAM
- 4.8GB¹ Ultra ATA Hard Drive
- 3.5" 1.44MB Diskette Drive
- 3Com® 10/100 LAN CardBus PC Card
- 256-bit Graphics Accelerator
- High-fidelity Audio SoundBlaster Compatible
- 24X Max² Variable CD-ROM Drive
- 14.1" XGA Colour TFT Display
- Microsoft® Windows® 98 Second Edition
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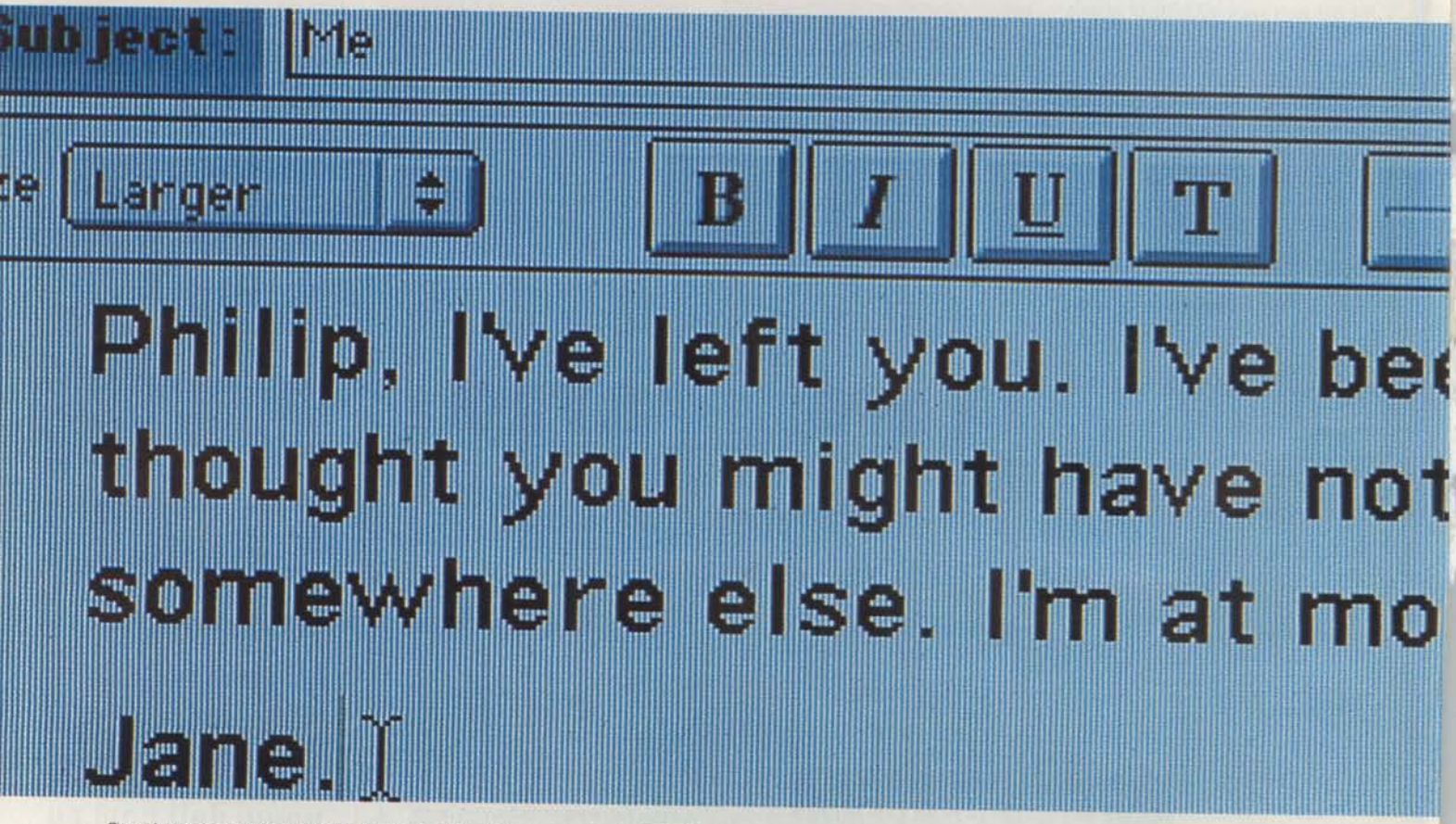

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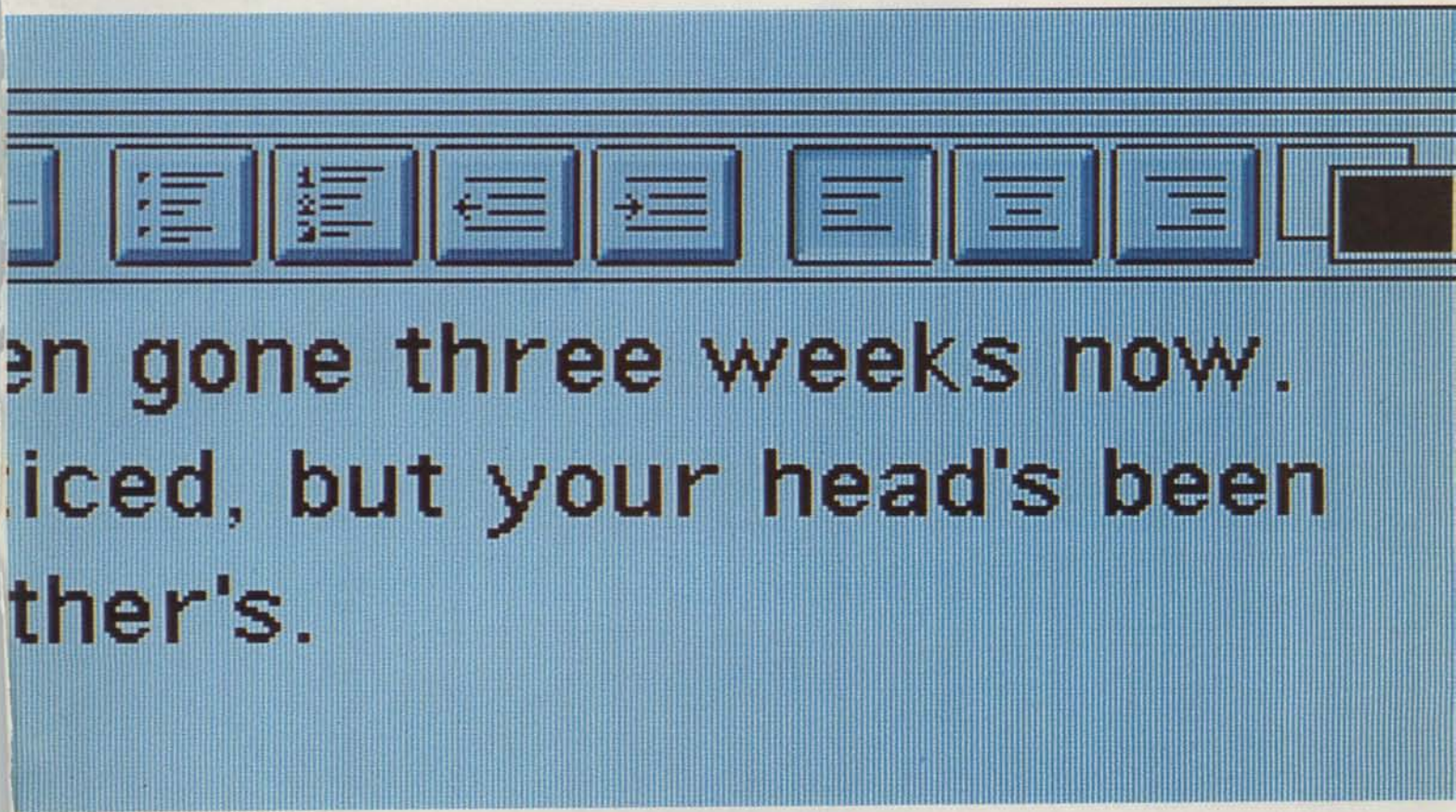

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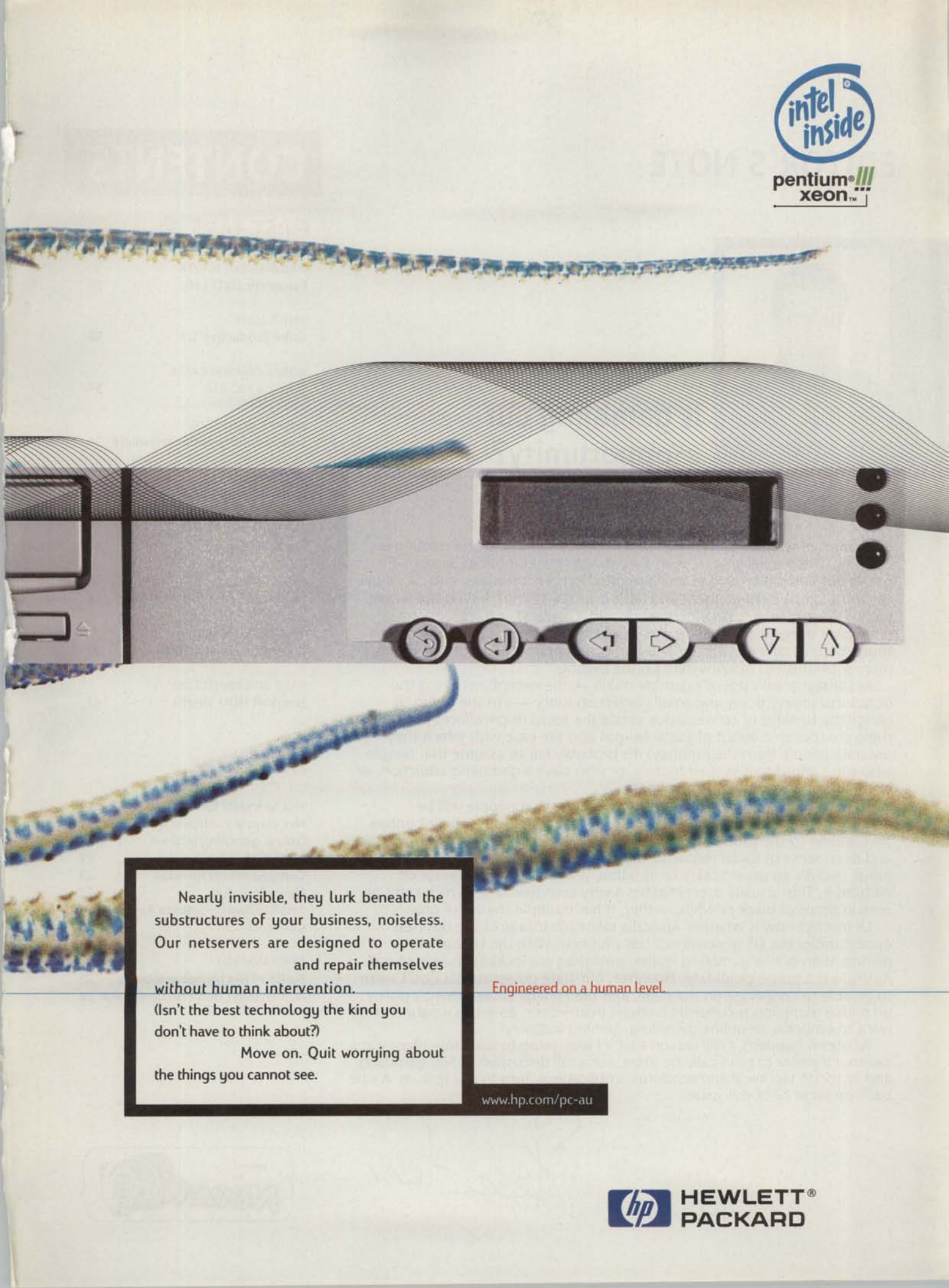
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EDITOR'S NOTE

Is gambling our e-opportunity?

Regardless of whether or not we want it, online gambling and gaming is upon us. This means anyone with a PC, modem and Internet access who passes authentication and account registration processes can enter a virtual casino or sports betting agency. What's a virtual casino? A Web site where you can wager money on virtual blackjack or roulette and let software determine the outcome. If you win you get paid, if you lose, tough. And a sports betting agency? It's the TAB and others online, and potentially has more sophisticated options than phone betting.

As someone who doesn't gamble much — the exceptions being the occasional lottery ticket and small wagers on footy — I'm still trying to gauge the benefits of convenience versus the social implications. Just as there are concerns about physical casinos and the ease with which they separate people from their money, it's probably fair to assume that people who can't afford to lose their money, or who have a gambling addiction, or both, will be trying their luck online.

The pro-online-gambling fraternity will argue that people will be separated from their money in any case, and so taking the concept online isn't adding to the problem. Proprietors will proffer their moral righteousness and deep sense of social responsibility. The anti-online-gambling lobby will argue that it's an unnecessary temptation, and that we'd be better off without it. This actually oversimplifies a very complex issue, which can't be seen in terms of black or white; rather, it has multiple shades of grey.

Of interest now is whether Australia takes advantage of the business opportunities the US government has shunned. With the US out of the picture as an online gambling leader, operators are looking elsewhere and Australia is a prime candidate. However, our state governments don't seem to be able to cooperate on the issue, and the Federal Government's policy on online gambling is currently unclear. In any case, do we as a nation even want to embrace an online gambling/gaming industry?

Whatever happens, I still reckon that if I was going to risk some money at a casino, I'd prefer to physically be there. For a full discussion of Net gambling and its social, technical and economic implications, turn to our feature 'A sure bet?' on page 72 of this issue.

Steven Fear

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A sure bet?

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apcmag.labs

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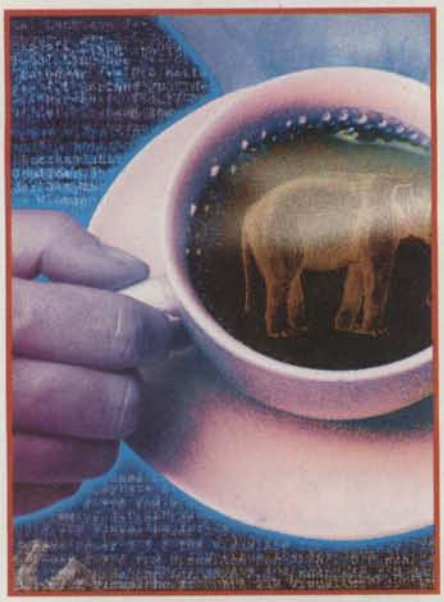
- Western Digital Enterprise WDE18300-0049

SOFTWARE REVIEWS: JAVA AND C++ DEV TOOLS



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For developers, choosing the right tool is crucial to the timely completion of a high-performance application. *APC* puts development environments for C++ and Java developers under the microscope.

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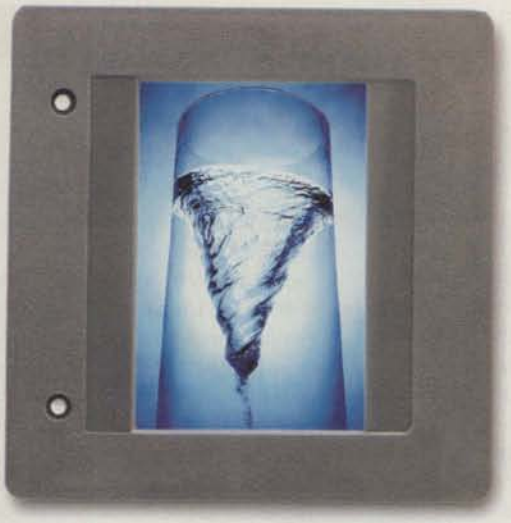

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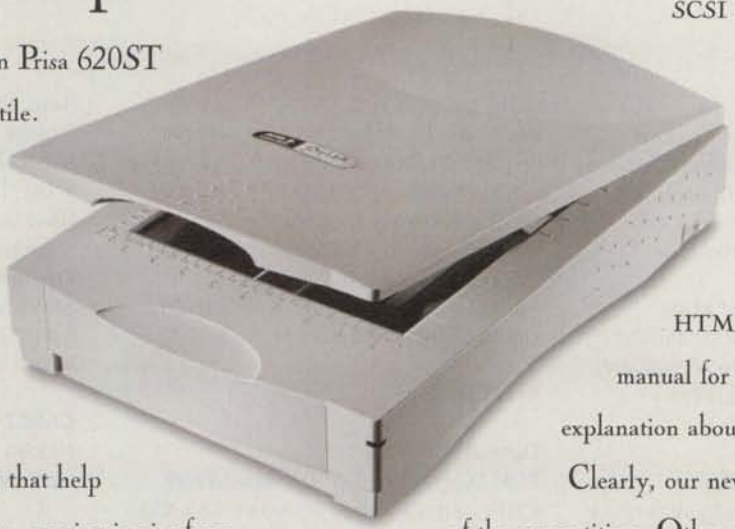

There's also an HTML-formatted electronic manual for a more detailed explanation about how everything works.

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Each piece of software includes instructions on whether you will need to unzip the file before installing it, and most also include README files. A complete list of software included on this month's discs is included below.

All you need to use **apcmag.cd** has been created in HTML. You do not need any special software to access the discs, other than a standard browser. The CDs have been tested using Netscape Navigator 3.0 and 4.0, and Microsoft Internet Explorer 3.0 and 4.0.

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While we've taken every care to ensure that the software provided is useful and that it works, we cannot accept responsibility or liability for any of the products included.

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Java and C++ development tools
Borland C++Builder 3 Standard, Borland JBuilder 2 Standard, Symantec VisualCafe 3.0, IBM VisualAge for Java 2.0 Entry Edition, DJGPP

Scripting tools
123Search 2.0, AceExpert 3.02g, ActivePack 1.0, Alpha Lite 7.2, Anthill Scripter 1.0, BBEdit Lite 4.1, Dippy Bird's JavaScript Documentation, EditPad 3.5.0, EditPlus 1.24, Form Validation Tools 2.0, Java Stuff 1.6, JavaScript Editor 2.0 , JavaScript Scrambler 1.11, Joust 2.3.7, Jsonline 0.4, NetObjects ScriptBuilder 3.0, NoteTab Light 4.60a, OpenImage 1.0 and more

FIRST TAKE
pcAnywhere 9.0, EntryPoint

THEMEZONE
Buzz Light-years Away II, Elvis 1956, Feline, Jimi Hendrix, Juventus, Laurel & Hardy, Lion King, Propaganda, Rembrandt, Smashing Pumpkins 98, Star Wars: Droids, Stone Cold Theme, Street Fighter Zero 2, Superman, The Beastie Boys, The Simpsons and more

WORKSHOP
Windows: FinePrint 3.43, Graph Paper Printer 3.31, Poster-Printery 2.0d, PrintFile 2.1.3a, PrintKey 2000 5.03
OS/2: Clearlook 1.71, DeScribe 5.0
Mac: AliasMenu 2.1, BeHierarchic 4.0.1, ColorSwitch Pro 1.2.2, Default Folder3.0.3, DragThing 2.7, Snitch 2.6.2
Linux: Expect, Rsync, Sgml-tools, VNC

DISC 2

Tune and tweak
BCM Diagnostics 1.01.02, BinaryWork CPU Controller 1.0, Cacheman 3.60, CD-Quick Cache 3.21, Cool Info 99 2.5c, CPU Stability Test 1.0, Graphics Depot Monitor Tests 1.4, Matrox Overclock Version 3.0.0, Modem Doctor 1.0, MTUSpeed Pro 4.10, PowerStrip 2.51.06, Powertweak 1.05, SiSoft SANDRA 99, Tweaki 2.2, TweakIt 4.0.4, Voodoo3 Tweaker 1.0, WinOptimizer 99 Deluxe 1.0, WinRAM Booster 1.22.05, WinTune 98 1.0.33

Gambling games
1 Deck Poker Select 4.1, 2X Cherry Slots 1.2, 2X Dynamite Slots 1.1, 32 Card Bridge 1.6, 3D GoldRush 1.1, 3D Hotslots 2.1, 3D Proslots 1.1, 3D Roulette 1.1, 3D Ten Thousand 1.01, 5 Card Poker, Poker Collection 1.2, 500 Card Game 5.4, 8 Ball Slots 1.2, Absolute Slots 1.3, Advanced Video Poker 1.1, All American Gin Rummy 2.0, Ancient Ivory 3.2, Animated Keno 1.2, Arcade Horse Racing 1.0 and more

Hard drive utilities
BigDisk 1.5, Cacheman 3.6, Directory Snoop 3.0, Diskeeper Lite, DiskState 1.14c, Drive Monitor 3.1, FATMon 1.2.06, Hard Drive ScanDisk Pro 1.0, Index & Shutdown 1.0.4, KDiskFree 0.5.1, Kmemmon 0.2, Lost & Found 1.0, MBRSCAN 1.1, PictureTaker 1.52, Save Butt 1.2, The Partition Resizer 1.3.1, Virtual Drive 3.1, Waste 2.6, Wipe 0.58.6

GAMEZONE
Hidden & Dangerous, Heavy Gear II, Midtown Madness

FEATURE
MediaRing Talk 99 6.5

BROWSERS
Microsoft Internet Explorer 5.0, Netscape Communicator 4.6, Netscape Communicator 4.08, Netscape Navigator 4.08

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COMING UP

ISP reviews: *APC* has done it again; that is, we've tested and reviewed a stack of local ISPs. If you're thinking of becoming a churn statistic, these reviews will show how your current ISP compares on price, performance, plans and service. We'll also discuss the results of our annual ISP Service & Reliability Survey.

South-East Asia and Y2K: How will the Y2K issue affect the already challenged economies of South-East Asia? This article will focus on those countries with which Australia has important relationships, such as Indonesia and Malaysia. Have business and government been able to properly prepare for Y2K? Is there enough time to take constructive action? How can Australian businesses help out?

Downtrodden IT workers: We always hear how sought after IT workers are, but not all IT jobs are well paid. Next month we'll take a look at how easy it actually is it to find IT work.

All this plus news, views, reviews, CDs and more in November *APC*, on sale October 21.

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DOMAIN BATTLE

Hot to squat? Get in quick

The Federal Court has issued an order preventing the use of domain names associated with Internet authority Melbourne IT, paving the way for a possible crackdown on the common practice of 'cybersquatting'.

Melbourne IT controls the registration of .com.au domain names through its Internet Names WorldWide subsidiary and is attempting to gain a foothold in the global domain registration market.

In mid-August, the company announced that several people were asked to cease using the domain names IT-Melbourne.com, Melbourne-IT.com, and ITMelbourne.com. The domains were previously registered in the US by Queensland residents Simon and Marilyn Strauss.

Melbourne IT claims the Strausses offered all three domains for sale or rent on the Internet. Another company, Atnet, was also found to have used a domain associated with Melbourne IT.

Each of the defendants has been restrained from advertising, selling, renting or offering

Continued on page 18

OZ CENSORSHIP DEBATE

Net control controversy

The majority of Australians don't believe that law enforcement is the best way to control Internet content, according to a survey commissioned by the government body charged with implementing such laws. However, the same government body went to some trouble to downplay the result, even as other industry bodies worked frantically to come up with codes of conduct relating to the new laws.

The Australian Broadcasting Authority (ABA) recently completed a global study, in conjunction with the Bertelsmann Foundation and other industry groups, designed to assess international attitudes towards Net content control. In early August, the ABA released a small portion of the results from the survey. It emphasised the finding that nearly 70% of Australians believe some sort of Net reporting hotline should be introduced. The ABA said at the time that full results from the survey will be released in September.

However, by that time the Bertelsmann Foundation had already released a number of findings from the survey which painted a very different picture. In particular, it found that 71% of Australians have doubts about whether law enforcement can effectively help Net control. In the US and Germany, 63% and 72% of respondents have similar doubts. Overall, 80% of those surveyed believed the use of filtering by individuals is the best means to control Internet use by children.

The ABA downplayed those findings. "Australians see industry, government and Internet users themselves as all having a part to play in the appropriate supervision and selection of Internet content," states the ABA in its initial report on results. Eventually, the ABA was forced to move its release deadline ahead, and issued further results from the survey.

The ABA then revealed that the survey was conducted in June among 1,200 Australians, 60% of whom were Internet users. Although 76% believe the Internet poses

Continued on page 18

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AUSTRALIA'S TECHNOLOGY NEWS

Hot to squat? Get in quick

Continued from page 17

Internet domains associated with Melbourne IT. The Strausses were ordered to hand over the relevant domains to Melbourne IT within 21 days.

Melbourne IT's lawyers claimed the ruling is a victory in the war against domain name "pirates". Lawyer John Waters said that people who register business names and then sell them run the risk of prosecution. "They may be held liable for trademark infringement and/or passing off, among other actions," he said.

The ruling is also a significant test case for domains registered in the US. Although local domains are covered by strict trademark rules, the same controls do not apply overseas. Questions still remain over another domain, Melbourne-IT.com, which has been registered to a London address.

Melbourne IT had another problem with domain name registrations earlier this year, when one disgruntled customer registered a domain featuring the name of Melbourne IT's domain registry Internet Names Australia (INA). Melbourne IT responded with threats of legal action.

Problems have also occurred over the INA domain registration policy, which has come under fire in recent months. This includes a previous instance where INA customers were able to register US trademarked names such as Nike, Lycos and Nasdaq. General manager Clive Flory admitted the policy is an "administration headache", but said INA is not responsible.

Local domain owners have been left with a warning by Melbourne IT CEO Peter Gerrand. "The granting of these injunctions confirms that domain name pirates will not be tolerated by the Australian legal system," he said. The company recently celebrated the awarding of the 100,000th .com.au domain name.

However, not everything is looking rosy for trademark holders. The common assumption that US companies that own trademarks can reclaim associated domain names has also been challenged. A US appeals court has ruled against labels giant Avery Dennison, which sought to gain access to the domain names avery.net and dennison.net. While the company won an initial court battle to reclaim the names, an appeals court ruled that Avery Dennison had not established that its trademarked name was being unfairly exploited by the competing site. The decision may impact many similar cybersquatting cases.

William Maher

Not what you might think

Many popular .com domain names are replicated in Australia — but not by their original owners.

Global

- **cdnow.com**
  Popular online music store. Domain owned by CDnow.
- **nasdaq.com**
  The US market for small-cap companies. Domain owned by Nasdaq.
- **lycos.com**
  Well-known portal site. Domain owned by Lycos.

Local

- **cdnow.com.au**
  Domain owned by Cattle Dogs Now Australia.
- **nasdaq.com.au**
  Domain owned by Carosa Holdings (Nasdaq considering legal action).
- **lycos.com.au**
  Domain owned by Light Years Communications.

Net control controversy

Continued from page 17

risks and 79% of people with children believed the Net contains content unsuitable for minors, 76% said they have not personally encountered disturbing material online.

About 78% of respondents believe that a rating system similar to that used for movies — the kind of scheme proposed under the Broadcasting Services Amendment (Online Services) Bill 1999, which will come into effect on January 1 next year and be administered by the ABA — could be used. However, 90% believe that end-user filtering is a good idea. A scant 15% of those surveyed believe ISPs should be responsible for running such hotlines. This suggests minimal support for the broader concept that ISPs should be responsible for regulating Net content, which the bill proposes.

Rules proposed

The concept of a Net reporting hotline is not widely supported within the industry either. ISPs should not engage in universal blocking of content deemed prohibited by the Australian Broadcasting Authority (ABA), according to the Internet Industry Association (IIA).

The IIA, which has long advocated a self-regulatory approach to the Internet in Australia, has released the latest draft of its Internet Industry Code of Practice. The new document addresses the Federal Government's censorship regime, as well as unsolicited email, ecommerce consumer protection and privacy.

Under the IIA's policy, ISPs must provide users with tools such as filtering software, which they can use to control the access to content in the home. According to the IIA, the ISP is "not expected to absorb the costs associated with meeting this obligation". Instead, the suppliers of the products will be responsible for ensuring their products comply with the government's bill, and will be required to provide updates to the software to filter "any additional material which the ABA has classified as prohibited".

If the code is supported by industry and adopted by the ABA, which will be responsible for monitoring Net content, then the ABA will have no role in issuing access prevention notices to ISPs within Australia. "In cases where serious material is referred to the ABA, the Authority will independently inform relevant law enforcement agencies in the host country through appropriate channels," it states.

Other voices opposed to the bill are beginning to emerge. A report, *Building a Stronger Information Economy for Australia*, by the National Australia Bank, Deloitte Touche Tohmatsu, and law firm Arnold Bloch Leibler, has blasted the legislation.

Any legislation that seeks to restrict access to the Internet will not be well received, and consequently the government's bill has ben widely criticised, the report asserts. "The approach that has been taken is considered to be unworkable and places Australia out of step with the international community," the report states.

While the government's intentions of protecting minors from offensive material online are "widely understood and appreciated", the report concludes other approaches should be pursued, such as child-safe mechanisms that should operate at the home computer level. Another option may be the establishment of a "child-friendly subset" of the Internet where content is given the green light before being posted. "Parents should then be charged with the responsibility for ensuring that their children only have access to this subset level of the Internet".

Angus Kidman and Roulla Yiacoumi

Twinhead

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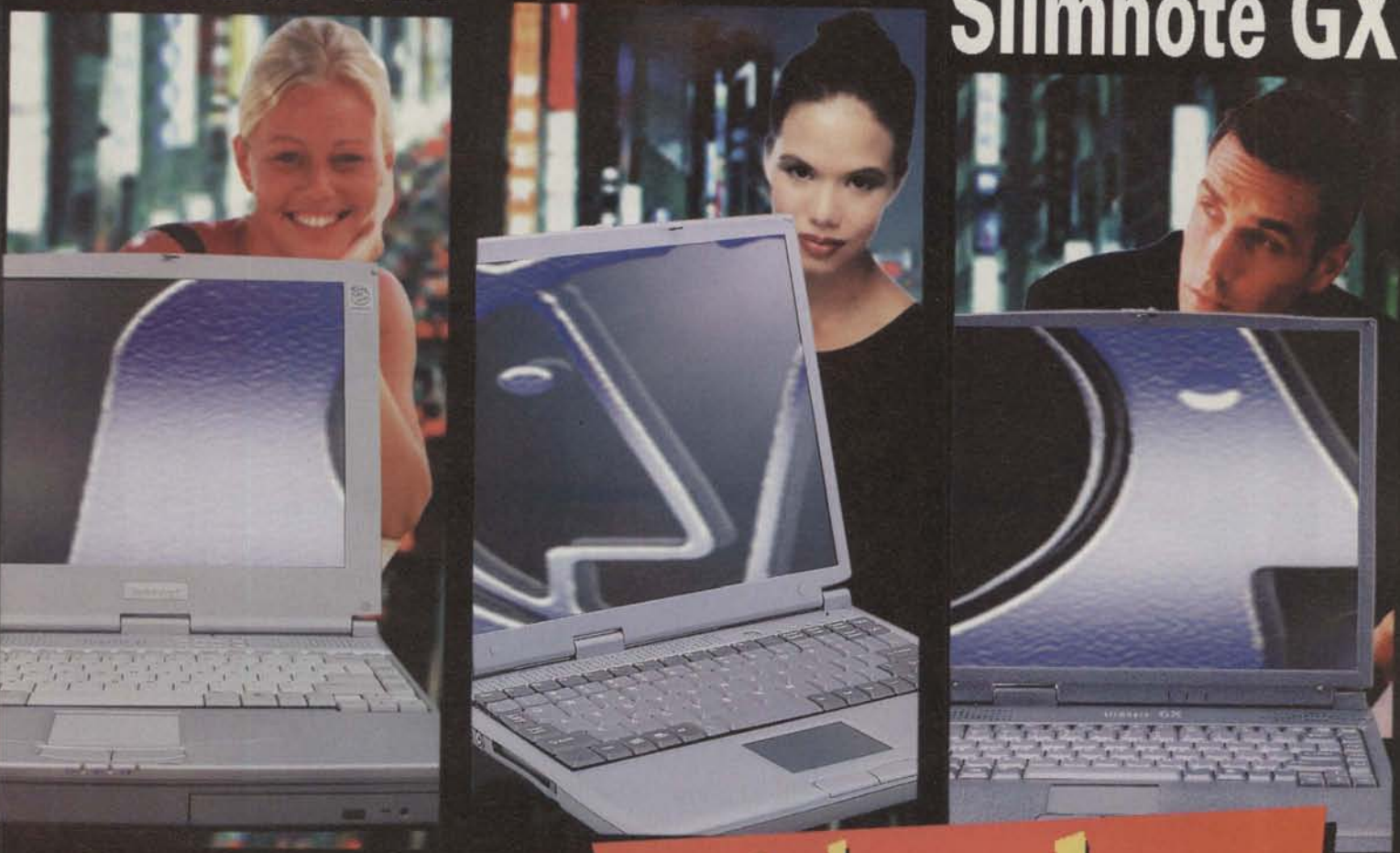
Slimnote GX



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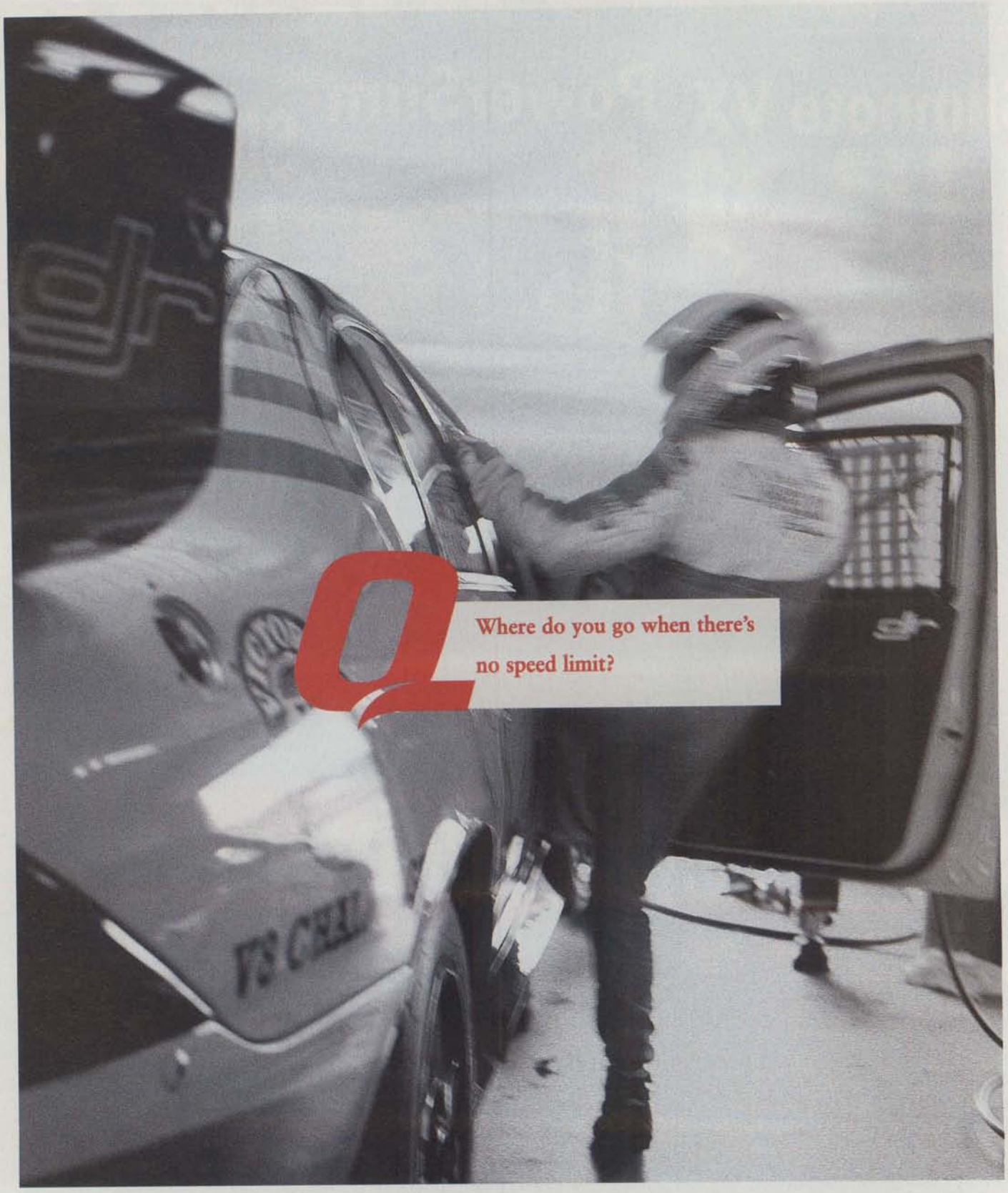
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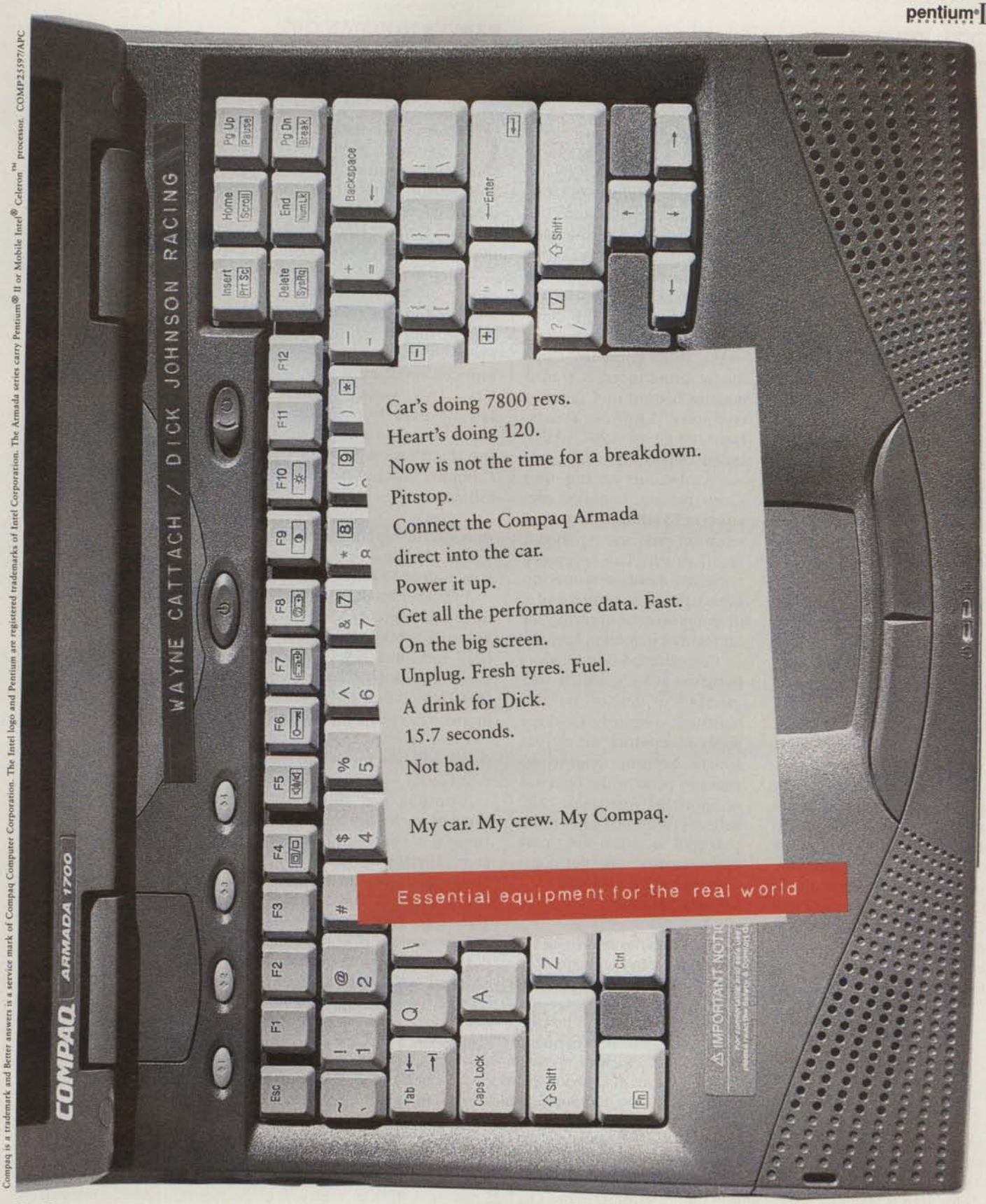

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MIXED RESULTS

Online gambling interest continues

Interest in online gambling companies in Australia continues to grow, although one of the first such businesses to list on the Australian Stock Exchange (ASX) has experienced mixed fortunes.

Australian online gambling company eBet failed to excite the attention of investors when it listed on the ASX in late August. To raise $10 million, eBet floated almost 20% of the company through an offer of 20 million shares at 50 cents each. Since listing, the stock has remained essentially static.

eBet's failure to ignite investor enthusiasm was something of a surprise, since the company reported strong interest in its public offer, receiving more than 5,000 applications for shares. Just prior to the float, it announced a record turnover for the month of July, making more than $1 million from wagers on its Web site.

eBet currently operates the New Zealand TAB services online and has the licence to offer Tattersalls lottery products over the Internet. The company has signed an agreement with US wagering company Penn National Gaming to establish eBet USA, a Web site offering gambling on US and international racing. eBet plans to expand its services into the Asian market in the future.

Meanwhile, other companies continue to attack the market. Just days after it said it was abandoning video distribution in favour of the more lucrative Internet gambling sector, listed company Cinimagic announced it would acquire betting and gaming company Capital Sports. Established in 1997, ACT-based Capital Sports focuses on Australian racing and sports betting. It posted revenues of $33 million in the last financial year and reported a small profit. The company currently holds a wagering licence for sports betting and is in the process of applying for an Internet gambling licence.

Consolidated Gaming Corporation (CGC), which was granted a licence by the Northern Territory Government to operate an online sports betting operation, plans to acquire the business of SportsBet Australia. CGC believes its licence gives it the potential to create the "most sophisticated" Internet gaming business in Australia.

Cosima Marriner

***APC* examines the rise of Net gambling on page 72.**

HARVEY NORMAN OUT

Compaq moves on retail

Compaq Australia is continuing to move ahead with plans to open its own chain of retail shops, despite its resulting loss of distribution through Harvey Norman and Harris Technologies.

Citing a need to move into new markets, Compaq announced in early August that it would open its own branded retail outlets. Two weeks later, Harvey Norman terminated the distribution of Compaq machines. Estimates of the size of Compaq's business through Harvey Norman vary widely, but some reports place it as high as $97 million.

In the cutthroat PC market, there will be plenty of vendors lining up to take over the business, including key Compaq rivals Hewlett-Packard and IBM. Hewlett-Packard recently launched its own online shop, but has rejected suggestions that it will also move into the retail sector.

Compaq has since outlined plans for the shops, but there's a surprising exclusion. There will be no pilot shops in Sydney selling its "configured to order" computers to experienced consumers and small businesses.

There are various "constraints" which lead Compaq to leave Sydney out of the trial, officials said. Compaq intends to open five trial shops in Melbourne and three in Brisbane during September and October, where customers can buy computers assembled to their specifications on site. "It made sense not to spread it all around the place," said Compaq business and consumer general manager Greg Healy.

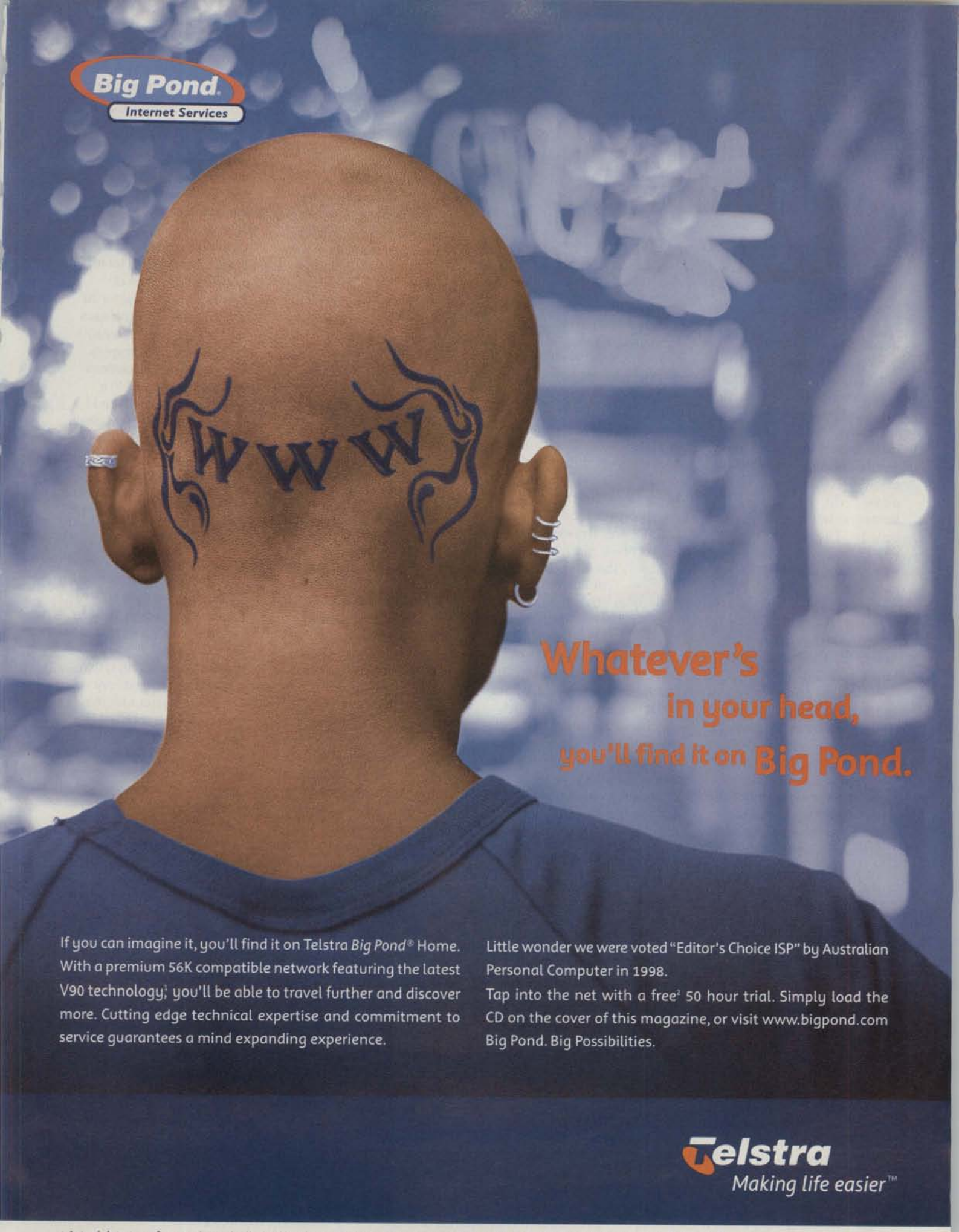
If the pilot proves successful, Compaq will roll out between 80 and 120 shops nationally; some of the shops will be franchised. "Obviously we are very confident that this is going to work, otherwise we wouldn't have done it," said Healy.

The company has designed its new strategy to specifically target experienced consumers and small businesses. Its research has found experienced consumers seek lower prices, while small businesses seek the "latest and greatest" technology. Compaq believes its integrated direct sales strategy will benefit both these groups of customers by offering cheaper prices (10% to 15% lower) on computers that are configured to order and delivered more quickly.

Angus Kidman and Cosima Marriner

News Roundup

- Telstra is trialling a service that allows customers to answer calls on their PC without losing their Internet connection. The system, Telstra Internet Call Waiting, is being offered free to Telstra customers until early December, before its launch in early 2000. Officials say the service has only been available for a short time in the US, and has already become popular. The company expects about 10,000 people to participate in the trial.
- Lotus continues to dominate the groupware market in Australia, accounting for more than 42% of the 2.6 million local users of groupware products. A study of the Australian integrated collaborative environment by IDC Australia found that Lotus signed up 347,800 users of Notes and Domino in 1998, bringing its total number of users to 1.25 million, or 42% of the market. Microsoft, which has been gaining ground on a worldwide basis with its Exchange suite, ranks second with 228,000 new users, 408,000 overall users and a 28% market share. In third place is Fujitsu's TeamWare Office, followed by Novell and Netscape, although none of those products achieved even a double-digit market share. The study was co-sponsored by Lotus and Microsoft.
- Small ISPs should be cautious about playing in the 'free PC' market, a research analyst has warned. Lane Leskela, the Gartner Group's Dataquest senior analyst of digital commerce and Internet access in



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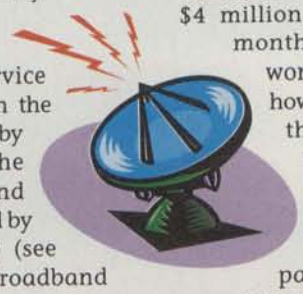
BATTLE OF THE BEAT

Satellite music comes to Australia

Australian music buffs will soon have high-speed access to CD quality music and videos via satellite, as two local companies strive to dominate the emerging market.

Telstra has announced plans to trial an online music service called Velocity, which allows CD quality audio via streaming technology. The service will be trialled in the next few months by customers of the new Big Pond Advance powered by Satellite (BPAS) (see 'Battle of the broadband bucks, page 26).



Velocity has already sparked the interest of record company Mushroom Records, which has signed a deal to provide music content over the network. Mushroom officials said they are impressed by the satellite service, which offers more security and copyright protection than Internet delivery.

Telstra officials said the service will be especially suitable for remote areas, where high-speed communication has been a problem. Despite these claims, concerns remain over the cost of the new satellite service, and the potential for pirates to interrupt satellite feeds.

Meanwhile, Web content provider LibertyOne is continuing to push its own satellite and cable music service, Satellite Music Australia. The business was acquired by LibertyOne in April this year, and officials are already predicting revenues of $4 million in the next 12 months. The company won't reveal exactly how many customers the service has, although they say that the numbers are "in line" with the take-up of pay TV. The company delivers music to satellite customers of Foxtel and Austar, while LibertyOne has also negotiated an agreement with Optus.

Satellite Music Australia says it has the largest library of digital music in the southern hemisphere, and more than 1,300 commercial customers. According to Satellite corporate communications manager Christopher Muldoon there are also plans for expansion, although he won't reveal details yet. "We have a couple of initiatives in the pipeline," he told *APC*.

William Maher

Cashbook

In last month's issue, we noted the increasing prevalence of .com mania among mining companies (see *APC* September, page 28), and the trend shows no sign of abating.

In a typical example, mining company Capricorn has taken a stake in ecommerce company b2b to deliver services over the Internet to the local healthcare sector. Subject to shareholder approval, Capricorn will pay $500,000 for 500,000 shares in business-to-business ecommerce application provider b2b. A subsidiary of US company e-Medsoft.com, b2b intends to list on the ASX this year.

The calibre of the technology developed by Martin Communications will set mining company Pacarc's acquisition apart from similar technology investments undertaken by some of its peers, according to the company. Chairperson Eddie Stoyle said Pacarc had long sought a new business focus as the market appetite for gold has steadily weakened. Martin Communications develops telecommunications technology, focusing on network management software and microwave technology.

Another example is mining company Chile Minera, which has announced its intention to purchase trading software company Timemac and outlined plans for a capital raising. Chile Minera has gained shareholder approval for its proposed acquisition of Timemac in exchange for 20 million shares at 8 cents each (worth $1.6 million in total). Chile Minera will change its name to Timemac Solutions and change its status to a public company. To raise $1.3 million working capital, the company will issue 6.5 million new shares at 20 cents each.

Not all investments are the result of stock manipulations. Coolgardie Gold intends to pay for its techno-stake with cash. Coolgardie has announced its intention to take a 55% equity holding in a technology startup. The company has developed a logistics and tracking system for the transport industry. Executive director Malcolm Smartt said the company's cash reserves of $8.5 million is a crucial distinction between it and other mining companies that have recently invested in technology startups.

For up-to-the-minute financial news from the IT sector, check out Newswire's continuously updated Cashbook service at http://newswire.com.au/cashbook/.

News Roundup

the Asia-Pacific region, said the business model of small providers offering hardware to secure long-term Internet customers is not sustainable. Leskela also said consumer spending in Australia was set to increase to $US7.6 billion by 2003, up from $US1 billion.

- AAPT has stepped up plans to launch its CDMA mobile phone network next year. Samsung will build the new network at a cost of $375 million. Officials also announced that revenues had increased by 50% since the 1998 financial year. AAPT is also considering a float, following Hutchison's successful ASX float.
- Nine out of 10 Australian executives have never used the Internet to find a job, according to a new survey. IT recruitment firm The Executive Network found that while senior executives earning between $70,000 and $150,000 had used the Internet for general browsing, most are unwilling to apply for positions online. Most of the 151 executives surveyed view current Internet job boards "with mistrust and fear", but 60% said they are willing to use the Internet for future job searches if confidentiality can be guaranteed.

For complete versions of these and many other stories, be sure to check into **http://newswire.com.au**.

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After a sluggish start, companies are lining up to offer high-speed Internet services. Consumers will get faster services, but at what cost?

Battle of the broadband bucks

In January 1999, if you wanted a high-speed Internet service, you effectively had one option: Telstra's Big Pond Advance service. It currently offers the fastest available service, but uses a download charging model which is unpopular with many users. By January 2000, at least two other companies will have entered the fray, but it's still not clear whether costs will be reduced significantly.

Regional pay TV provider Austar has entered the increasingly active broadband space, promising to launch a high-speed Net satellite service by next year. Austar is establishing a separate operating company, Austar United Broadband, to offer high-speed Net access and enhanced television services. Austar has a total of 350,000 subscribers, ranking it second — behind Foxtel, and ahead of Optus — in the pay TV market.

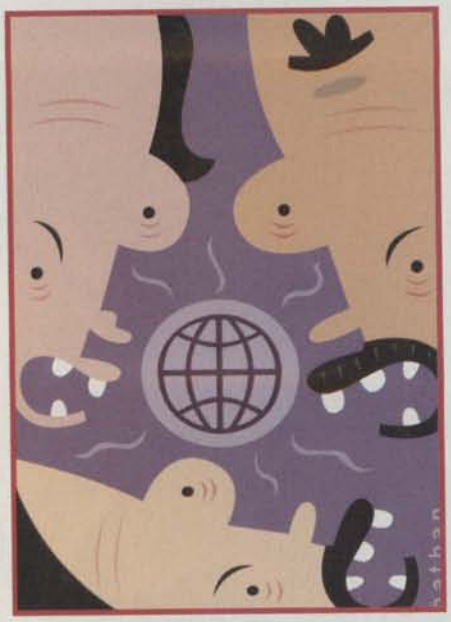
In a statement to the ASX, Austar said that the rollout of services will begin in the fourth quarter of this year. A full launch is planned for early 2000.

The service will be welcomed by rural residents, who have so far been largely untouched by Telstra's Big Pond Advance service and Optus' much-hyped but yet-to-be-realised alternative. Optus, which is working in partnership with US company Excite@Home, plans to launch its Optus@Home service later this year.

Although Optus has yet to compete directly with Telstra in the cable Internet market, it seems that a price war may already be brewing between the two companies. Telstra cut the price of its Big Pond Advance service with a new installation deal for Foxtel subscribers. The price of a cable modem dropped to $395 from $540, while installation and connection costs were cut by $95.

Optus has consistently maintained that its cable service will be cheaper than Big Pond Advance. Excite@Home has indicated that Optus@Home is likely to charge a flat monthly fee, which could provide it with a significant advantage. Telstra, on the other hand, charges customers 35 cents per extra megabyte for downloading more than 100M of data each month.

Telstra still appears committed to this model, however, and plans to use it with a



new satellite service, Big Pond Advance powered by Satellite (BPAS). BPAS and covers the whole country, but priority is given to users in areas without existing broadband services (which only reaches some parts of east coast capital cities). As the universal service obligation (USO) has been extended to include a 64Kbps data service, customers outside ISDN service areas will benefit from a 50% subsidy of the hardware costs, capped at $750. However, the installed cost of the customer premise equipment varies from $1,548 to $4,915, so many users will still face bills of thousands of dollars.

Prices vary according to the size of the satellite dish required and the remoteness of the location. The smallest dish (85cm) works in the area around Melbourne, Sydney and Adelaide, and includes Tasmania. As you move away from that zone, the angle to the satellite changes and a 1.2m dish is required. In certain areas, notably Far North Queensland, a 1.5m dish is necessary for adequate performance in the wet season. Residential customers are defined as those in single occupancy premises up to two storeys high — everyone else must pay a premium of about $750.

Under this scheme, someone living in a flat in Sydney would pay $2,215; a residential user in Far North Queensland living more than 10km from a town with a population of 1,000 would pay $4,915 plus $1 for each kilometre away from town (less any USO subsidy). However, the setup costs are just the beginning; there are also monthly charges. Two services are offered: Basic 64 and Standard 400. Basic 64 is capped at 64Kbps, and costs $40 per month plus 35 cents per megabyte after the first 50M. Standard 400 (up to 400Kbps) is $55 a month plus 35 cents per megabyte after the first 100M. Other plans will be developed as patterns of use emerge.

Users will also have to pay for dialup ISP access to carry data from their computers to the Internet (the 'back channel'). There's no requirement for them to use Big Pond, so at least they can use the provider with the closest POP to reduce STD charges. That will add around $20 to $50 per month, plus phone charges to their total bill.

To offset this problem, BPAS offers a 'push' service where selected content (newsgroups as well as the most popular Web sites) will be scheduled for automatic download to the user's PC without requiring a dialup connection.

In the meantime, the general use of pay TV systems such as broadband cable is coming under increasing scrutiny. Content providers have been given the green light to supply programming to existing pay TV cable systems, following a declaration by the Australian Competition and Consumer Commission (ACCC).

The regulator, which first outlined its plans to declare the service in June this year, said the decision will promote competition for retail pay TV services. Through declaration, the ACCC can force carriers to provide rivals with access to the services required to supply competitive services to consumers.

However, the regulator has stopped short of allowing the same access to 'technology neutral' digital networks, saying the move is premature. "The ACCC will continue to monitor the development of digital services, including digital broadcasting services, to assess whether declaration of digital broadband access services would promote the long-term interest of consumers," said ACCC chairperson Allan Fels.

Angus Kidman, William Maher, Stephen Withers and Roulla Yiacoumi

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SERV/5723

Despite recent changes, IT executives believe listing rules need to be relaxed further before more tech companies float.

ASX changes don't go far enough

Australian technology companies are distinctly underwhelmed by the relaxation of some of the Australian Stock Exchange's (ASX) listing requirements, and most believe more changes need to be made before any real effect is felt.

In late August, the ASX announced that it was simplifying the rules that govern whether or not a company can list. A key change was the removal of the requirement that a company have net tangible assets of $2 million and profits of $1 million per year, providing it can demonstrate it will gain a market capitalisation of more than $10 million. It does not require businesses to demonstrate that they will be revenue-positive within three years of listing.

Officials said the changes are designed to remove artificial barriers to entry, but admit that they will make it easier to attract technology listings. Many technology floats have enjoyed a high capitalisation, but are not expected to be profitable until the use of the Internet and other related technologies is more widespread. The new rules came into effect in September. The ASX has also recently signed a deal with the US Nasdaq exchange which will eventually allow joint listings (see *APC* August, page 26).

Malcolm Day, the director of Internet adult products retailer AdultShop.com, which gained a backdoor listing on the ASX through the acquisition of mining company Western Minerals, said the news would have made little difference to the company's strategy. "[The mining company] already had money in the bank and more than the requisite number of shareholders."

Allan Phillips, chairperson of mining company Eastern Gold, shares Day's sentiments. He said the changes will have little impact on the plans of the numerous technology companies Eastern Gold has invested in, including 131Shop, POSMEDIA and Jumbomall. The introduction of the admission requirement of a $10 million market capitalisation, as an alternative to the $2 million net tangible assets test and $1 million profits, is "much of a muchness", Phillips said. "Most floats are bigger than that these days," he said.

Phillips believes the key change is the reduction in the number of required shareholders from 500 to 400. "In normal times, getting a parcel of 500 shareholders was quite a hurdle," he said. "Right now there is a lot of interest in the market, so it is not so hard to get shareholders."

The relaxation has not affected the strategy of ecommerce Web developer, Nextracom, which has been waiting for the right opportunity to float on the ASX. The company is currently raising $2 million in pre-float capital through the enterprise market, a strategy which managing director Andrew Curtis believes is working well. Nextracom intends to go public early next year.

However, according to recently floated Internet sports betting operator eBet, the ASX has been acting under the relaxed requirements for some time now. "The ASX has adopted the policy already, although it hasn't formally put it in place," said eBet managing director Keith Cullen. The only change that might have affected eBet's listing plan is the alteration of the rules governing the amount of net tangible assets companies can hold in cash. The requirement that companies which hold more than half their assets in cash have binding contracts showing how that cash will be used, have been replaced by a less stringent requirement.

Calls for more change

Although the ASX news was met with little interest from established technology companies, all believe the changes to admission requirements should encourage startups to go public. Under the new rules, companies that aren't turning a profit of $1 million no longer have to demonstrate they will be able to generate revenues within three years of listing. "With Internet startup companies it is generally understood in the first couple of years they are not going to generate a profit," said AdultShop's Day. "The relaxing of the rules will help those companies."

Many industry players believe the requirements need to be relaxed even further, and some have called for the introduction of a second board for technology stocks. Eastern Gold's Phillips sees an unsatisfied need for an Australian venture capital market. "There is a lot of product out in the marketplace right now," he said. "We need another market to separate the industrials out into a technology market."

eBet's Keith Cullen went even further, calling for the entire listing process to be reviewed. Cullen is concerned about the increasing number of Australian companies, frustrated by ASX listing requirements, that are seeking money offshore. "The cost of raising capital in this country is extremely high in percentage terms, " he said. "If a small company wants to raise a couple of million dollars, it's really not practical to list here."

Cullen believes the ASX needs to continue to vary its admission rules in order to remain competitive with other markets. He agrees that the introduction of a second board could be the answer, if "the listing rules aren't quite as stringent, and investors are aware it's a high-risk market and go into it with their eyes open".

Nextracom's Curtis said that although the ASX changes will assist medium-size businesses intending to float, the "capital black hole" barriers still exist for small technology companies and startups. "Unless they can raise the right amount of capital it's pretty much impossible to meet the criteria," he said. "You need a substantial amount of equity." Curtis said the current level of nervousness among technology investors makes it difficult to find that equity. "A lot of the hype has been retail, not investor, hype."

Cosima Marriner

The new rules

- Companies that capitalise with more than $10 million don't need net tangible assest of $2 million and profits of $1 million per year.
- Businesses don't have to show that they will be revenue-positive within three years of listing.
- The requirement that companies which hold more than half of their assets in cash have binding contracts showing how that cash will be used has been relaxed.
- The number of required shareholders has dropped from 500 to 400.

Panasonic DVD-L50

The trickle of DVDs appearing on shop shelves has yet to turn into a torrent, but the situation has improved drastically in the last six months. Now you can choose from more than a hundred titles, although the selection may seem somewhat esoteric at times. Hardware vendors continue to innovate and there are now portable DVD players.

The latest portable device is the Panasonic DVD-L50, a 600g device only slightly larger than a portable CD player. The DVD-L50 has a small 5in TFT screen to view DVDs on the go. As an added bonus, it can also play CD music and video CDs (VCDs).

The DVD-L50 has a double clamshell design. The top half contains the screen and the bottom half flips open to store the DVD, VCD or CD. The quality of the screen is excellent. It uses the standard 16:9 aspect ratio for DVDs, and its resolution meets the DVD playback resolution exactly.

The inbuilt speakers are also quite good considering their tiny size. However, we recommend that you use headphones — both for audio quality and to save you from annoying the person next to you on the plane.

In an added piece of 'because we can' functionality, the system can also be configured to receive input via RCA audio and video jacks, to be displayed on the small screen and played on the speakers. The obvious use for this is playback from portable video cameras.

The DVD-L50 supports the full range of DVD features, including multiple language support, multiple subtitle tracks, different camera angles, menus, chapters, parental lock and so on. You're not missing out on any of the features of a full-size standalone consumer DVD player when you get this product, with one exception: 5.1 channel digital audio decoding. The DVD-L50 is natively capable of stereo output via a standard audio jack, but for 5.1 channel sound you have to connect it to a separate AC-3 decoder. That said, it's highly unlikely that AC-3 would be used much in a portable environment anyway.

Overall, the audio output is very clear. The DVD-L50 even supports the new DVD-audio (96kHz/24-bit) standard — which would be great if there were any audio DVDs to be had.

Controlling the functions of the player is easy. It has the standard play/pause/forward/rewind controls as well as a simple menu for setting language, angle, subtitle and other options — most of which can be changed live. A dial on the side of the unit controls audio volume, and all of the jacks and plugs are clearly labelled and easy to access.

It should be noted that the DVD-L50 *does* honour zone restrictions on DVDs, so one purchased in Australia is capable of playing only zone 4 movies. Don't even think about buying DVD movies from the US or trying to save money by ordering the player from overseas, as it would only cause you pain in the long run.

Surprisingly, the DVD-L50 also comes with a credit card-sized remote control with a range of 7m. At first this seems superfluous on a portable device. However, when you realise that it is also designed to be hooked up to larger television screens, it makes sense.

The DVD-L50 comes with cables to hook it up to a stereo PAL TV via either composite (RCA) cables or S-Video. When we connected it to a large screen television system, the picture was as good as if we'd connected a full-sized, standalone player to the TV. You don't get native AC-3 decoding in the devices, but full stereo output is available, and there was no indication of any artefacts or inconsistencies when the image was blown up to a full-sized screen.

The kicker with a product like this is the battery life. The original version, the DVD-L10, only had a two-hour battery life — barely enough to watch most movies. This has been expanded in the DVD-L50 to three hours — fairly paltry, but enough to get through most movies. Fortunately, it has a battery charger which allows the battery to recharge when connected to the mains power and the battery is plugged in. The battery, however, adds considerably to the weight of the device.

The other big problem with the product is the price. At over $3,000, most people just won't be able to afford this device, no matter how groovy it is. True, it does integrate the features of a number of other items, including a portable CD player, a stereo CD player, a standalone DVD player and a VCD player, but it's still an awful lot of money to fork out for something so easy to lose or break.

Nathan Taylor

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In short	An outstanding portable product — if you can afford it.

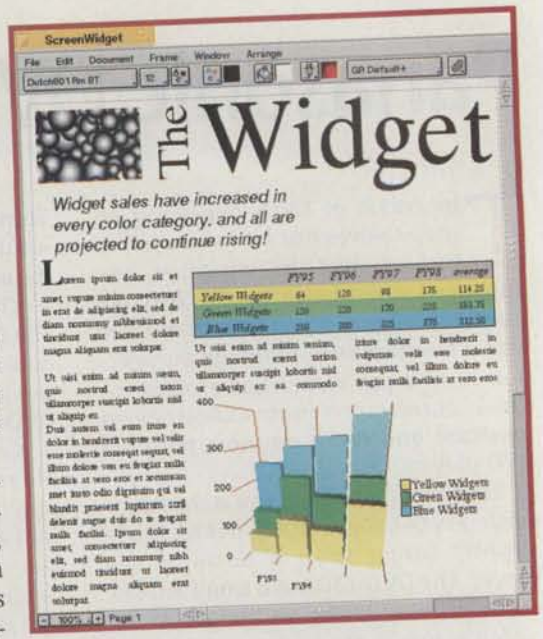
Gobe Productive 1.1

The comment most often heard about BeOS is something along the lines of 'nice OS, shame about the applications'. In other words, BeOS is fantastic for multimedia applications, but still lacks the basic productivity apps, such as office suites, that would make it a viable standalone solution. After testing Gobe Productive, *APC*'s reviewers think there is more than a little fact in this oft-repeated phrase.

For those accustomed to complex installation procedures, installing Gobe Productive is a breeze. Insert the CD, double-click on the installer, and 30 seconds later it's up and running. Running Gobe Productive is an exercise in retro computing. One look at Gobe's interface and features, and suddenly it's 1995 again — you're running Microsoft Word 2.0. If only Word 2.0 had run this smoothly . . . but then, we never ran it on a 450MHz Pentium II or under an OS as efficient as Be.

Gobe is a suite of five applications: word processor, spreadsheet, presentation package, drawing program and image editor. The elements of the package are well integrated, and the interface is fairly consistent throughout. Spellchecking, text formatting and other features are also consistent throughout the suite. Each application has its own undo history and you can adjust the number of events it remembers.

It's easy to insert a spreadsheet or chart into your word processing document. In fact, Gobe's simplicity is actually an advantage, it's much easier to insert and link objects than it is in Windows' office suites. Double-click on an embedded object and you're instantly editing it. This makes it very easy to create integrated documents like the one shown in the screenshot on the right. There was, however, no obvious way to change the way text wraps around pictures and other objects.

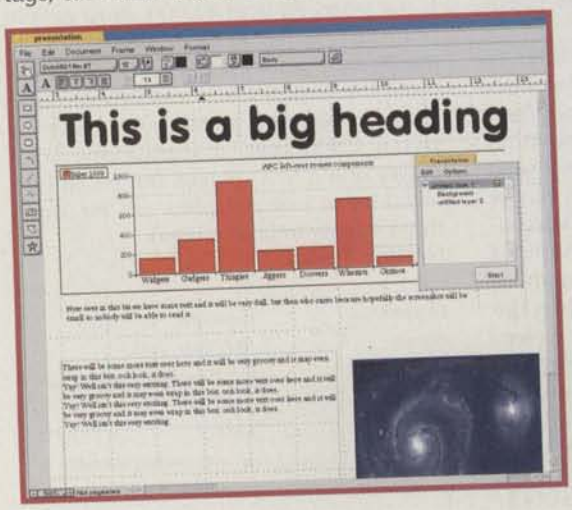


Like most Be applications, its memory footprint is small. Opening any individual application will take up about 3M of memory, and having one document of each type open takes up less than 10M.

The word processor is fairly simplistic. You can adjust all the basic formatting options such as font, spacing, alignment and colour, and you can apply and adjust styles, but that's about it. You can push text into newspaper-style columns, but there's no support for tables, mail merge or anything else more complicated. The spreadsheet looks simple, but has a wide range of mathematical, statistical and business functions.

Creating charts from your data is very simple — perhaps a little too simple, because it doesn't give you a lot of options. There is a very limited range of chart types, and you have very little control over how they look within the individual styles.

The graphics tool is the equivalent level of 10-year-old graphics tools on other platforms. It allows you to place text and a range of predefined shapes, and adjust the colours. You can rotate shapes but not text, and forget about anything as advanced as skewing. But if you think this is simple, try the presentation tool. Take a blank page, throw whatever you like on it, and then view it as a presentation. No overview or outline features, no transitions between pages, just all the same features as the graphics tool with the added bonus of a slideshow.



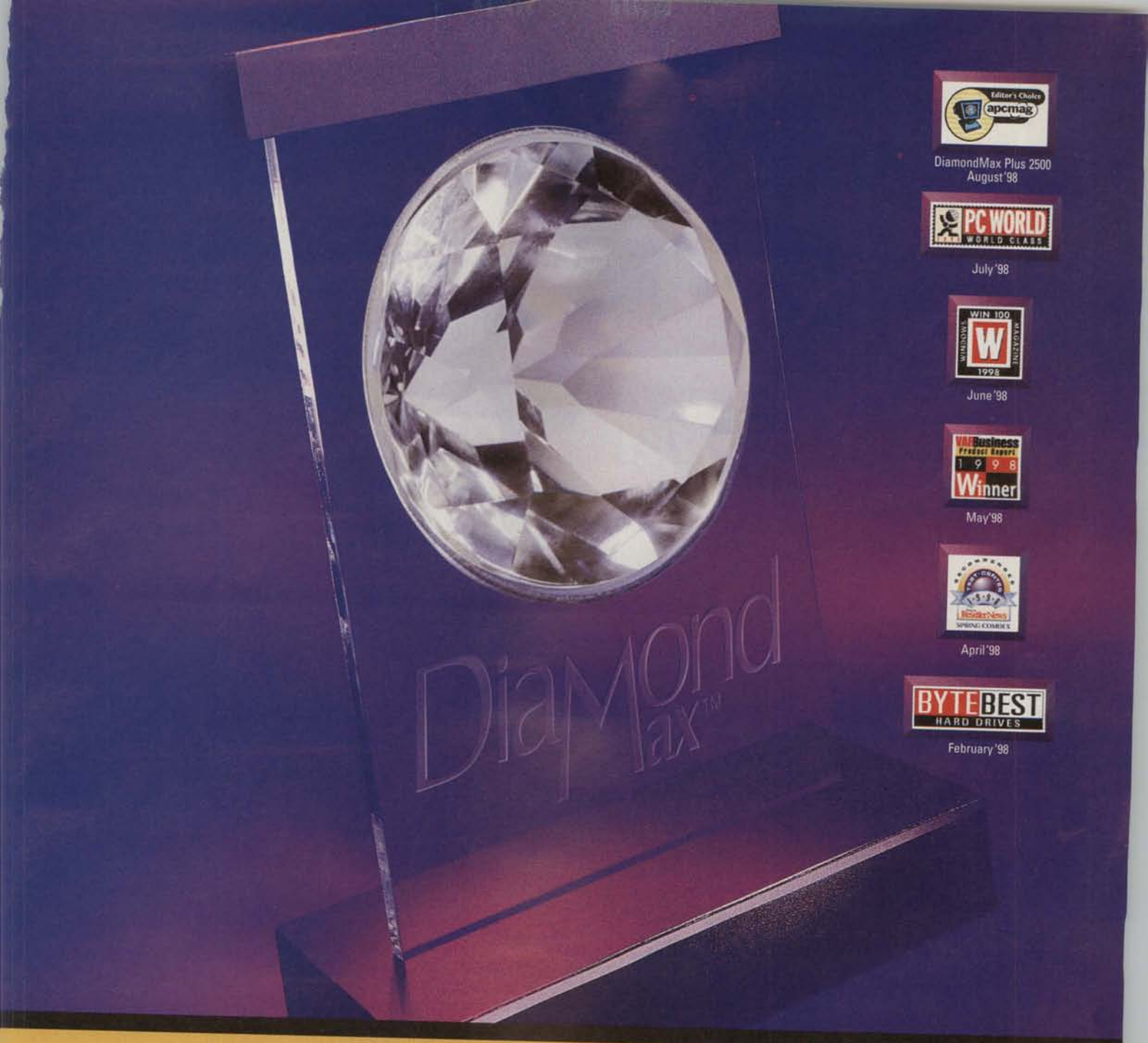
The image editing tool probably has everything you need to prepare photos for presentations, but don't expect much more. As well as cropping, rotating and flipping the picture, you can also apply a series of plug-in filters — the usual range of sharpening, colour, brightness and contrast, and a few more exotic changes. On the other hand, it doesn't have some of the more common photo retouching tools such as clone.

Overall, one of Gobe's main problems is compatibility. It can't import any of your existing files in common formats like Word, WordPerfect, Excel or 1-2-3, nor can it save to many convenient formats. Your only options for the word processor are Gobe's internal format, plain text, RTF or HTML. The spreadsheet can import delimited text, but not much more. Even its list of graphics file formats leaves out a few obvious choices such as GIF and TIFF, which clearly limits its usefulness.

Although Gobe Productive can be useful for most simple tasks, and runs a lot more smoothly than the bigger suites with more features, it lacks a great deal of functionality. It needs a lot of development before it can replace office suites that run under other OSes, so you'll have to keep that Windows partition for the time being.

Josh Mehlman

Distributor	Custom Technology
Phone	(02) 9686 4055
Online	http://www.gobe.com/
Price	$169
In short	Runs well, but it doesn't do much.



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Ericsson MC 218

You're obsessive about keeping in contact. You get the shakes if you can't check your email or surf the Web for a few hours. You have an Ericsson mobile phone. You (or your employer) have far too much money. If this sounds like you, rush out today and buy an MC 218.

The MC 218 further blurs the distinction between a PDA and a subnotebook. It's about the size and configuration of a large PDA — small crowded keyboard and 640 by 240 backlit LCD screen. Its clamshell design means the keyboard slides out when you flip open the screen. Unless you have very small fingers, typing is going to be a two-finger hunt-and-peck job, bearing in mind that a lot of the symbol and punctuation characters are not where you would expect them to be. For a device that's so Internet-focused, it's odd that the / key is Shift-7 while the @ key is F2 — you would think it would have been a good idea to make these keys a little easier to access.

Ericsson's MC 218 runs on a 37MHz ARM 710T processor and uses Symbian's EPOC32 operating system. This is the same OS used by Psion Series 5 organisers. The organiser comes with 16M of memory. The OS is quite attractive, and makes good use of the limited screen space available. It allows multitasking, but switching between applications is clumsy.

In addition to all the standard organiser applications like contact list, calendar and to-do list, the MC 218 has a pre-installed word processor, spreadsheet and card index-style database application. It has sound playback and recording capabilities, and the sound recorder lets you compress your files to save storage space. However, the uncompressed sound takes up a lot of memory, so you can only record 30 seconds at a time.

Connection to your PC is through a cable that plugs into the serial port or through infra-red. Ericsson provides software that allows you to back up the MC 218 and synchronise your organiser with your PIM software. It also has some clever options. For example, it allows you to mark your out-of-hours appointments as 'private', or, if you prefer, don't transfer them to the PC at all. The software had no trouble synchronising with Microsoft Outlook, but it had all sorts of problems with Lotus Notes. It didn't appear to have options other than Outlook and Notes/Organiser, but chances are that third-party solutions are available.

Did we mention the Internet? The MC 218 comes with an infra-red modem that plugs into the bottom of all new Ericsson mobile phones as well as the older 600, 700 and 800 series phones. This allows you to connect to email, fax, Short Message Services and the Internet. The phone needs to be within about half a metre of the organiser with a direct line of sight, and if you lose the connection for more than a few seconds, the modem will disconnect.

The first advantage of this connection is that you can organise and edit your mobile's phone book easily on the organiser, and you can easily swap phone numbers between the two.

The Internet functions work with any existing dialup Internet connection. You enter the details of the account into the MC 218 in much the same way as you set up an Internet connection on your PC. The Internet connection has some advanced features like scripting and server-assigned IP and DNS addresses.

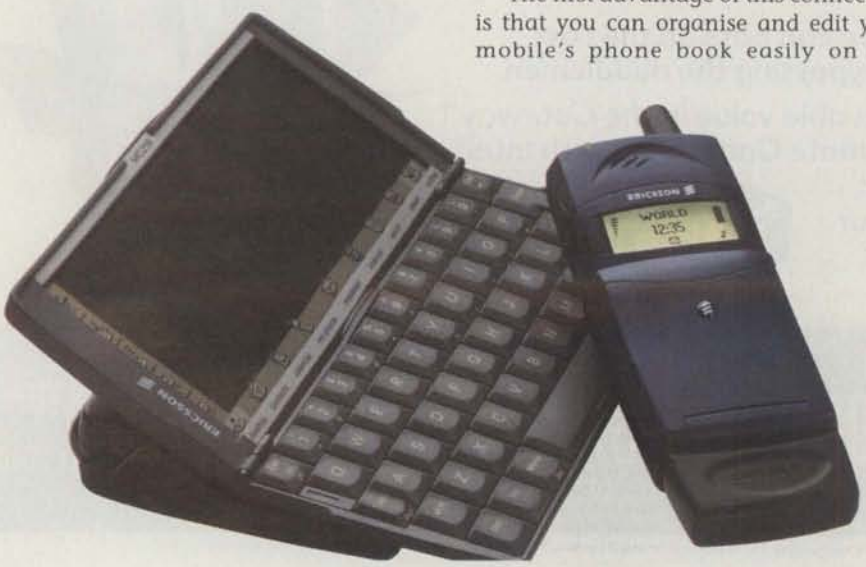
Once this is set up, you can access email and Internet content easily, but because of its small screen and the 9.6Kbps download limit of GSM mobile phones, accessing some Web content isn't all that much fun. The built-in Web browser can display pages with frames, but clicking through a link loses the frames. You can also download a Java virtual machine to run Java applets.

The browser can also handle Wireless Application Protocol (WAP), which uses a cut-down version of HTML called Wireless Markup Language (WML) to reduce the amount of data needed to transfer over the slow wireless connection. At the moment there is no WAP content on the Internet, but Ericsson assures us it's just around the corner. Ericsson also claims that by the end of the year Web-to-WAP gateways, which will convert standard Web content to WML, will be available.

There's also quite a large library of software available for download from the Psion Web site, http://www.software.psion.com/ or from PDA Central (see http://www.pdacentral.com/ for a list of mirror sites). PDA Central's 5 Alive News section has news on the latest Series 5 software.

Unless you have an Ericsson mobile phone — or are planning to buy one — you lose the main purpose of the MC 218, which is connectivity. It's an expensive solution, but if you factor in the off-the-shelf cost of a mobile phone it's probably about the same as the all-in-one Nokia Communicator 9110.

Josh Mehlman



Distributor	Ericsson
Phone	1300 650 050
Online	http://www.ericsson-mobiles.com.au/
Price	$1,299
In short	A clever solution for those obsessively in need of contact.

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Sonic Foundry Audio Anywhere

In the multimedia age, audio editing tools and libraries can be as essential for creating a presentation or Web site as image editing packages and clip art libraries. Sonic Foundry's Audio Anywhere package is pitched squarely at this market, promising to provide easy sound creation and editing tools for budding content creators.

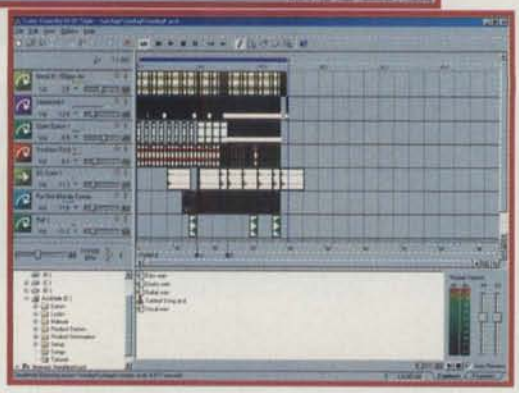
Although the packaging claims Audio Anywhere is an integrated sound editing package, in reality it's nothing more than two existing products loosely bundled from Sonic Foundry: Acid Style for creating loop-based music sequences and Sound Forge XP 4.5 for sound editing and file conversions. The absence of any real integration is emphasised by the lack of a common install routine (each package is included on a separate CD and has its own registration details) and, frankly, by the schizophrenic manual. This promotes Acid Style with a cursory and chatty tutorial (which seductively promises "no grouchy music teachers") but uses an utterly conventional (and mind-numbingly dull) presentation for Sound Forge's most basic features. There are some cursory cross-references in the package's online help, but beyond the discounted price, there's virtually nothing to differentiate this from the two products purchased separately, which is a pity.

The lack of detailed material on using the two products together to achieve a specific task (such as adding sound to a Web page or presentation) is disappointing, because the tools themselves are both highly functional.

Anyone familiar with the basic Windows Sound Recorder will recognise the approach taken by Sound Forge; audio files can be opened and converted between different formats, and selections can be cut and pasted into new files with a variety of mixing options. There's also an impressive array of effects that can be applied, including reverb options, pitch bending and waveform variations.

Similar functions are available in many shareware packages, but Sound Forge also has a number of minor but useful tweaks. The ability to always work on a copy of your sound files, rather than the originals, is extremely useful for avoiding permanent damage if you select the wrong option. There's also support for undo on most functions, although this can quickly eat into available memory.

Some of Sound Forge's more obscure options, such as applying noise gates, are unlikely to be required by most users, but are useful if you need to clean up dodgy samples. The numerous file conversion options are of more use to Webmasters, as files can be saved in RealNetwork's standard RealAudio and G2 formats or Microsoft's NetShow ASF, as well as the usual WAV and AIFF options. (You can't edit streaming files, which seems a sensible decision given the compression methodologies used.) The ability to intelligently mix different sound files is handy, especially when it comes to generating samples for use in Acid Style.



Once you've moved all your samples into the required formats and lengths, Acid Style allows you to easily layer them into complete mixes and compositions. It uses a series of tracks into which sound samples are placed. Each sample can be individually adjusted for volume, and cued to play at certain points in the overall mix. A selection of more than 800 samples is provided to get you started, covering obvious categories such as drums, bass, guitars and the usual selection of limited vocal effects.

Acid Style is limited to mixing eight tracks, but those with more complex requirements can upgrade to the Acid Music package, although at that level other professional sound editing packages may be a better choice. For presentations or Web site use, this isn't a practical problem.

Of course, your creativity with a package like Acid Style is effectively limited by the range of samples. While you're unlikely to create a true audio masterpiece in this way, it is ideal for creating brief musical interludes for emphasis or as a background track for a Web site. Of particular appeal to neophytes is the ability to automatically adjust samples for pitch and tempo.

The interface in both programs largely conforms to Windows standards, although the Explorer-like interface in Acid Style doesn't allow very consistent use of right-clicking. Export options in Acid Style are somewhat more limited. There are three choices: the program's own proprietary format, WAV or ASF. Of course, opening such a file in Sound Forge offers a wider choice. Sound Forge also offers OLE support, which simplifies adding background effects to presentations.

Users with little knowledge of sound editing and a desire to learn will find Audio Anywhere a very handy package, but would benefit from a single, integrated tutorial. Budding multimedia moguls will also find the package an appealing combination, but don't expect it to meet all your audio editing needs.

Angus Kidman

Developer	Sonic Foundry
Distributor	New Magic
Phone	(03) 9885 5888
Online	http://www.sonicfoundry.com/
Price	$149
In short	A handy pairing of audio tools, but the integration is a little disappointing.

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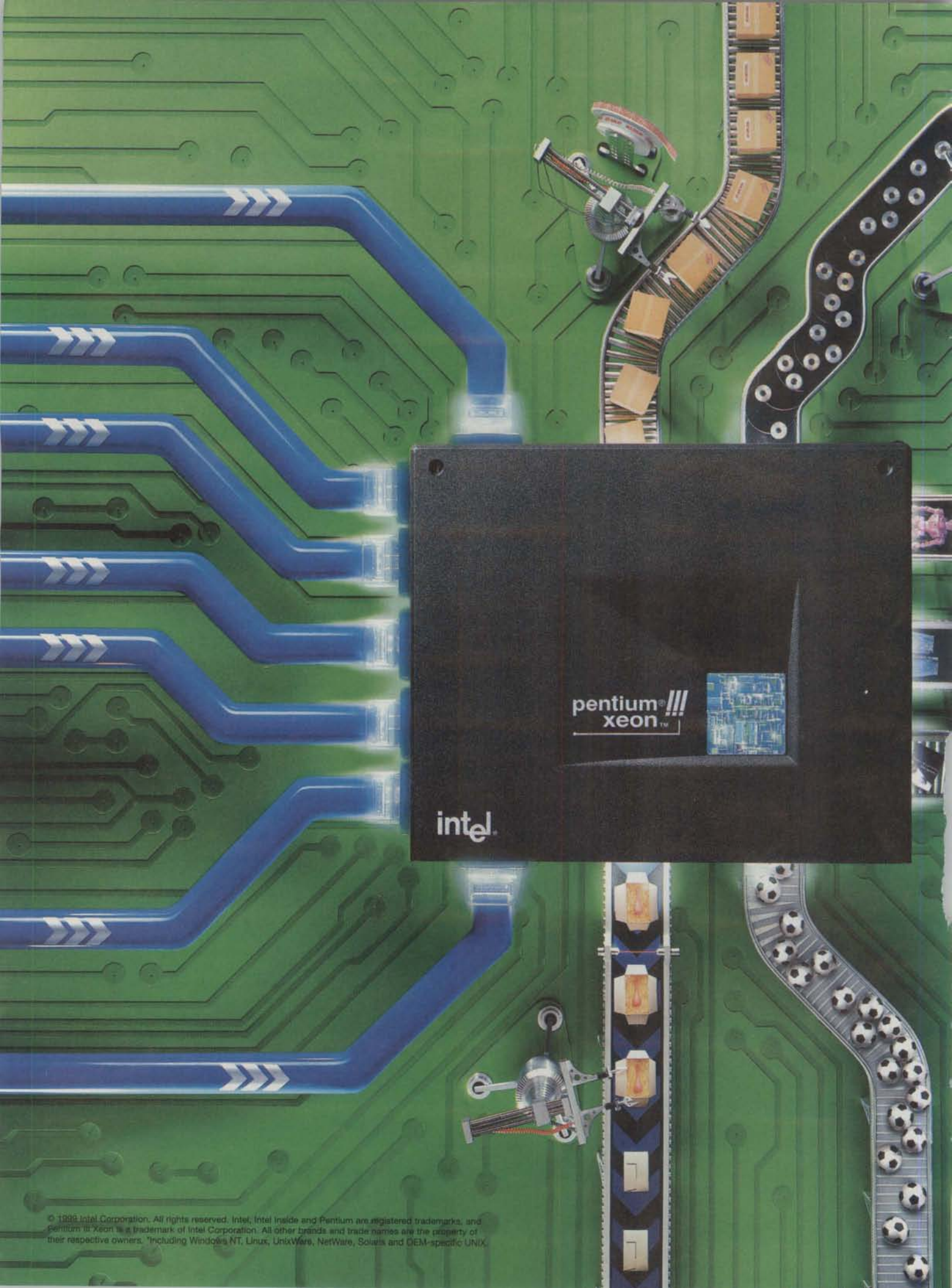

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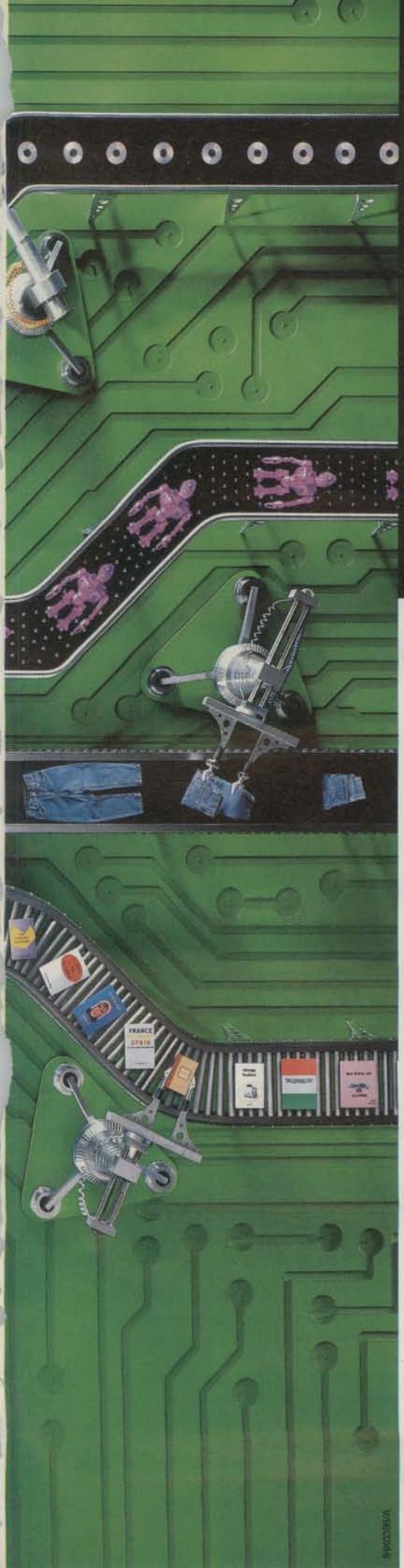

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Cidco iPhone

The future, they tell us, will be all about Net integration. Whether it's toasters, fridges or inflatable pool chairs, everything will be Net-ready. Cidco's iPhone is an indication of what we have to look forward to. It is a Net-ready phone — with limits.

The unit itself looks like a large Commander-style phone, except for the large LCD screen on the front which acts as the control panel for the phone's Internet and directory features. The quality of the 7.4in greyscale screen is quite good. Colour would have been a nice addition — although that would have also created the need for a faster modem. The screen operates at a resolution of 640 by 480, which should be fine for most operations, although some Web pages could prove problematic.

Input is primarily through the touchscreen, and a stylus is provided for this use. The stylus is a little too small, and the screen is not sensitive enough. In practice we found that a finger was generally more accurate, but finger tapping inevitably leaves fingerprints all over the screen. The screen is pleasant enough to look at from a variety of angles.

The iPhone's screen layout couldn't be simpler. When the phone is first switched on, you have a choice of six buttons. Call Log records any caller-ID enabled incoming calls, Directory allows you to set up a virtual address book for phone numbers and email addresses, and Settings allows you to register the phone and alter time and phone settings. The iPhone also supports hands-free speaker functions, along with a light which flashes when a message (voice or email) is waiting.

The real meat of the iPhone is in the other three buttons — Email, Internet and Listings. Email is handled through the dinky slide-out keyboard at the base of the unit. This isn't ideal for long messages, but works OK for short ones. The setup for the unit is almost idiot-proof — select Email or Internet and it will automatically dial into the server and access the last known page, or, failing that, the iPhone portal.

The Internet options of the iPhone are a mixed bag. We hit more problems with the Net implementation than any other section of the phone. The iPhone only works off a 14.4Kbps internal modem, but thanks to some server-end compression techniques which remove colour and compress pages, the performance is similar to a 33.6Kbps modem. The ISP service is provided by Connect, and at the time of testing, was still a little too flaky for *APC*'s liking. It's true that you can always reconnect (this is a phone, after all), but the phone charges add up.

The inbuilt browser renders all links as small onscreen buttons, which makes them much easier to press than if they were small-point text, but can blow out page designs considerably. It's also not very good with frames, as it can render them, but not scroll independent frames. So if the content or link you're after is a little down the side frame, for example, too bad.

Onscreen scrolling is handled by a set of buttons to the side of the phone controls. These don't really 'scroll', as the phone loads each visible page area seperately, so you scroll down to a blank area and wait for it to fill with information. According to the distributor, the browser can support most current Internet standards, including Java.

Scaling down to greyscale works reasonably well, although we found the screen tended to have problems with large areas of unbroken colour. For example, page backgrounds appeared almost like snowy television reception, which very quickly irritates the eyes. Speaking of physical matters, you'll need to be careful with the placement of the iPhone — it's easy for your head to end up craned too far over the slightly tilted screen, resulting in neckache.

The iPhone is particularly neat in its level of integration, as the Listings feature demonstrates. This is basically just an iPhone portal, but with modifications. Log onto the Yellow Pages listings, for example, and any listed number will become a dialable link just one screen-tap away. It's easy to rack up a lot of phone charges, however. Moving between the phone and Net apps seems more natural on a phone, but of course it's still another 25 cent call charge to consider. The ISP charge includes an email account, and the phone is capable of accessing any SMTP mail host for up to four other accounts.

At this stage, the iPhone Net access will set you back $24.95 a month for 10 hours, although better plans are available if you're willing to sign up for a fixed term. This is not unreasonable for a dialup account, although the service only operates at 14.4Kbps. Unfortunately, there is no choice but to sign up with Connect — no other ISPs currently offer an iPhone-compatible service. Also, as there is only one line connection to the iPhone, you often need to hang up and re-dial whenever you want to switch between Internet and phone functions.

The iPhone certainly paves the way for non-PC Net-enabled devices, and if the slightly glitchy connection and a few other problems can be sorted out, this would be a great phone. If future incarnations offer more — maybe some storage space, or an answering machine — then the iPhone will be really great. At the moment though, it fits into the category of a fun, but at times impractical, toy.

Alex Kidman

Distributor	Strathfield Group
Phone	13 11 77
Online	http://www.iphone.com.au/
Price	$699
In short	A very neat Web browser and phone that needs a more stable connection model.

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Pontis MPlayer3

Despite all the negative talk about MP3 music files — the lower-than-CD-quality audio, legal issues and so on — there seems to be a sudden proliferation of hardware MP3 players hitting the market. Pontis is the latest company to jump on the bandwagon, but its player offers something slightly different.

According to Toptec, the Australian distributors of the MPlayer3, the player has made waves across Europe, mainly because it uses MultiMediaCards (MMC) to store the music — it has no base memory to speak of. As the memory cards grow in capacity, so too can your MPlayer3. Sure, the other players can do this, but they all have a base memory to contend with each time, which can be very annoying.

At the moment, the largest MMC available is 16M, and with two ports this takes the MPlayer3 up to a total of 32M — enough for roughly half an hour of music recorded at 128Kbps. It is best to think of the storage as two separate 16M modules, as there is no spanning of chips and therefore it takes a bit of finagling to get the songs to fit on each card.

Another problem with the unit is the inordinate amount of time it takes to download songs from the serial port. Our advice is not to do this when you are pressed for time, as it took us nearly an hour to fill both cards. Luckily, you can use the system while this is happening, because it doesn't hog resources.

The MPlayer3 is stylish. It has a small LCD screen and the usual buttons for play, skipping tracks and choosing different play modes. It takes two AA batteries, which ran out after 12 hours of play.

It comes with the Pontis LED (load, encode, decode) software that lets you choose playlists, download and delete songs from the MMC, rip your own MP3s and even decode them to WAV format. The program is very basic, easy to use and no frills, but still delivers exactly what you need. For the first-time user the manual may be a tad baffling, but if you explore the program you'll easily work things out.

Fortunately, all of the niggles we experienced should be solved by the time you read this. MMCs that can store up to 30M will be available on the market, and the player will feature a USB instead of serial connection, which will increase the upload time by a factor of about 50.

Darren Ellis

Distributor	Toptec
Phone	(08) 8365 06550
Online	http://www.toptec.com.au/
Price	$399 with one-year RTB warranty
In short	Excellent player, but look for the USB version.

EntryPoint

In late 1995 and for most of 1996, one of the most popular free downloads on the Internet was PointCast. It offered a fast, customisable view of daily news and stock market information which updated in the background. It was the first attempt at providing an 'agent' which selected news from topic areas that interested the user, and could be set to run as a screensaver instead of stealing memory from other applications. PointCast made its money from advertising, which was displayed in a pane in the application window.

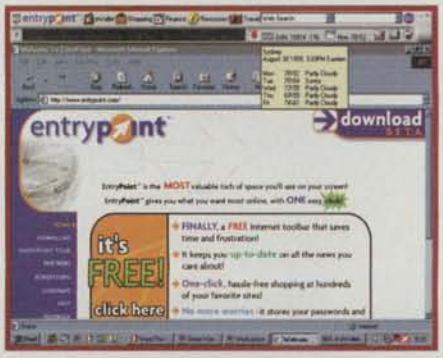
As portal sites grew, PointCast faded. Earlier this year, however, the company was bought by the developers of eWallet, an ecommerce application which automatically places credit card information in online order forms. The company, renamed EntryPoint, has released a free news ticker which attempts to combine the two applications.

The EntryPoint toolbar sits at the top of the screen. Customisable news, sports, weather and stock market information is combined with drop-down lists of online shopping possibilities. Headlines scroll past, and can be clicked to bring up the full story in a browser window. Ecommerce sites are triggered in the same way, and clicking on the toolbar's weather or stock market information will bring up a more detailed analysis.

Australian PointCast users may be disappointed by its US focus, but this may change as new versions are released. For example, the 1.0.1151 beta reviewed by *APC* recognised that we need Sydney weather, but gave temperatures in Fahrenheit and treated Sydney as though it was on US time. Celsius was available in the more detailed view, and the forecast was fairly accurate.

Only US stock market information was available, but the world news on offer — sourced primarily from Australian Associated Press — was impressive, although no specific Australian news or sports service is available. To maximise browser space, EntryPoint can be used to enter URLs, which means the browser's 'location' panel can be turned off.

The ecommerce side works quite well, but the functions performed by the wallet and toolbar are really just small additions to a normal browser session. The most annoying problem is that ecommerce listings can't be customised — selling placement is obviously a way for EntryPoint to make money, but it will annoy users if their favourite merchant doesn't participate.



EntryPoint is a slick, small, 32-bit application which appears very stable. It shows great promise, beyond any previous ticker-type application. No doubt it will be popular with Americans, but it may be some time before Australians can justify the screen space.

Simon Vandore

Distributor	EntryPoint
Phone	Internet only
Online	http://www.entrypoint.com/
Price	Free download
In short	Attractive enhancement to browsing and shopping, but still primarily for Americans.

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Diamond Monster MX300 Sound Card with A3D
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17" LG Trinitron Monitor
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Philips FreeSpeech 2000

Voice recognition software is making a slow and inevitable march towards perfection. *APC* has reviewed voice recognition software before — most recently Dragon Systems NaturallySpeaking Preferred and IBM ViaVoice Professional — but to date, none has bettered the ease of use and voice recognition rates of FreeSpeech 2000.

Like all voice recognition software, you need to train it to recognise your individual voice patterns after installation. Each person who will use the program must also train the software. Philips recommends a minimum of 15 minutes training time. You can start using the program after that, but it's better to be patient and spend the absolute maximum training time for best results.

If English is not your strong point, you can install FreeSpeech 2000 with any of 13 languages, mostly European, but Philips has promised that many other speech packs are on the way, including support for more Asian languages.

The FreeSpeech 2000 version we reviewed is the slightly more expensive one, which comes with a SpeechMike. This is a handheld gadget with a combination of trackball mouse, speaker and microphone on a reasonably long cable. The SpeechMike has been built to a high standard — the mike pickup is great for picking your voice out from ambient room noise, the speaker is crisp and clear (not tinny as we'd expected) and the unit fits quite comfortably in your hand.

The command key is a handy feature. When it is depressed, it lets the software know that the words currently spoken are a command. The software currently recognises over 11,000 commands, more than any other package. This means you don't have to learn the software's strict command set. Here they've covered every base. For instance the commands 'enter', 'new paragraph' and 'return' when spoken into a word processing program mean exactly the same thing. The software also allows navigation around the PC, works with any program that you normally type in, and is optimised for use with Microsoft Office and WordPerfect (it is actually bundled with some versions of WordPerfect Office 2000).

As an added bonus, FreeSpeech 2000 is the first voice recognition software that allows you to surf the Internet, and we don't just mean dictating URLs into the address bar. It analyses a Web page and makes the best guess when you read out the name of a link. This is the closest anyone has come to developing a remote control for the Web.

Darren Ellis

Distibutor:	Harvey Norman
Phone	(02) 9201 6111
Online	http://www.philips.com/
Price	$249 with headset, $349 with SpeechMike
In sshort	Voice recognition keeps on getting better, and FreeSpeech 2000 is the best yet.

JungSoft HDD Sheriff

If there was a universal PC user's wish list, it's a fair bet that one item near the top would be an 'undo/go back' button. How many times has a virus, unwanted software demo or a new Web download created mayhem on your machine? Often the only recourse is to reformat and reload everything from scratch. Or, if you are a network administrator, how many times has that unsolicited addition to one machine caused chaos on the whole system? Many times, no doubt.

Korean company JungSoft has come up with a simple way to ensure that every PC can have bulletproof integrity without resorting to removing floppy and CD drives or I/O ports. It uses an ISA or PCI card that carries its own BIOS EPROM, plus a couple of memory chips. JungSoft calls the card HDD Sheriff. The card interrupts the boot process to load its own hard disk routine every time the machine starts. At installation, HDD Sheriff automatically analyses the hard disk and repartitions it to provide two more logical areas, one accessible and one hidden.

It then takes a snapshot copy of the original data on C: drive, then compresses and stores it in the hidden partition. From then on, every time you boot up it replaces whatever was last on C: drive with the original version. So as long as the original was clean and working, every time you switch on you get the same setup, no matter what occurred during the last working session — even changes to the CMOS and those annoying cookies are reverted.

The other extra partition is used for data and is not replaced at boot, so changes to documents can be stored without a problem. HDD Sheriff controls can only be accessed via a BIOS level password, and can be set to auto-backup, manual backup, or supervisor access only. Other options include setting partition sizes, copying systems disk-to-disk, using previously erased data and changing passwords. The potential value of this device to schools, big businesses (and of course software reviewers) is outstanding. It is much faster than any backup utilities around — in fact startup is only a second or two slower than a straight boot. It is relatively cheap, and very simple to use. Most people wouldn't even know it was there.

If there is a downside, the manual and install procedures are both rather intimidating to non-DOS aficionados, but that could help keep the system more watertight. The best software protection system yet seen — full stop.

Jeremy Torr

Distributor	biT Distribution
Phone	(03) 9888 2005
Online	http://www.jsoft.co.kr/
Price	$159
In short	Brilliantly simple, yet effective.

Are you running your system on crude power?

There's no way you'd pump crude oil straight into your car. Yet you run your computers on some pretty dodgy fuel. The electricity supplied in most towns is subject to big swings of voltage, polluted by spikes and surges and lightning strikes. Doesn't it just make sense to refine that fuel before it reaches your valuable data?

A UPS (uninterruptible power system) is the method used in big sites. It was considered too expensive for personal computer use. Until now. The new SOLA 305 makes professional-quality power control simple. Just plug your data equipment into three battery-backed crashproof sockets. There are two extra, surge-protected outlets for peripherals.

For only $199 rrp you've protected your system and smoothed out your power.

SOLA. Controlling Power.

SOLA Australia Ltd **1800 339 531** www.solaaust.com.au

Professional power protection only $199rrp.

Forum

We welcome commments and suggestions. Send correspondence to *APC* Readers' Say, PO Box 37, Sydney 1028, or email APC@acp.com.au.
All correspondence becomes the property of *APC* and is subject to editing.

Always a catch

As mentioned in 'Wake up Australia' (Readers' say last month), both the US and UK have free Internet, the connection being given to regular customers of various banks and supermarkets. What we must remember is that in this life nothing worthwhile is ever given away, especially by big profit-making banks and supermarkets.

These plans only work when you have timed local calls because the local telephone company gives the ISP a kickback from revenue generated, and the bigger the organisation, the bigger the kickback. The side effect of this, other than a large telephone bill, is that the small ISPs can't compete and so don't exist. In the end you have no choice — you must join a free ISP if you want access to the Net.

However, we in Australia do have a choice, and if you want timed Internet then join one of the ISPs that offer this (from 2.5 cents a minute, they tell me). If you are like me and spend a lot of time on the Net, then join a pay by the month plan. Mine is $35 a month with no time limit. Wake up Andy Parry. You have a choice and if you don't like what you're getting, then change your supplier. Timed local calls would kill the Internet for many people in this country.

Adrian Sutton
Perth, WA

Good news week

We all have stories relating to the level of service offered by various companies. I would like to give a big thank you to the staff at PictureWorks for their prompt, efficient service. Our school owns a Kodak DC50 zoom digital camera which talks to the computer via PhotoEnhancer 2.1 software. We lost our copies so I emailed tech support to see if they could help. Within a few hours they made the relevent files available for download from their Web site — terrific service. Thanks PictureWorks. You have been an excellent role model for our students.

Martin Hughes, technology teacher
Parafield Gardens High School, SA

A couple of months ago I sent a wish list into **apcmag.com**. It's not often that things in life fall so neatly into place, but my wish list was fulfilled . . . and then some. I asked if *APC* could do a comparison of the latest Linux distributions. It was in the next issue. I asked if *APC* could do a review of the VMware PC emulator. It was in the next issue. I also enquired when the next issue of the *Linux Pocketbook* was due out. I got a reply the next day.

There was also an article in the issue about the ATO's e-tax program which I was curious about, but had neglected to ask. Thank you for your help. The items after which I was enquiring were not well covered by any independent, reliable sources at the time. *APC* provided this balance which, fortunately, confirmed my own research. I think that is why I have been buying *APC* since my old Commodore 64 days (I learned a lot about Disk Operating Systems from the Disk Manager program published in Basic way back then).

To put it in a nutshell, as long as you keep providing reliable information and tools for people like myself who are delving into publicly unchartered and undocumented areas of computing, you will continue to have a dedicated following.

David Nicholson
South Penrith, NSW

Yes, but . . .

You failed to include Xoom.com in the list of free space providers (see last month's *APC*, page 81). Could you put it in the next issue.

Avi Rotstein, Daniel Gruber and Jasmine Berger
Internet

Ed note: *Xoom was in our original list, but five separate attempts to get space from them only resulted in server crashes on their side — not exactly the best advertisement for their product.*

I would like to take this opportunity to congratulate you on your fine magazine. I have read *APC* for many years and it remains my favourite computer publication. I have always found it to be the right balance of news, reviews, editorial comment and entertainment.

However, after many years of enjoyment I was devastated to read the After Hours Bibliofile section of your July 1999 issue. In your 'Guide to Ratings' you used as the one star rating the description: 'Buffy: For suckers only.' As an avid fan of both your magazine and the brilliant television show *Buffy the Vampire Slayer* I was very disappointed. I implore you to change your 'Guide to Ratings' to read '★★★★★ Buffy: Slays all the competition'. I look forward to a change in the ratings. Please do not let this one blemish continue to detract from your otherwise excellent publication.

Kieran Masel
Brisbane, Qld

Ed note: *Cripes.*

I buy your magazine each month and I find it very informative. However, I am the owner of both a PC and an iMac and I find it very frustrating when it comes to finding information and articles on Apple computers and Mac OS in your magazine. There are no Mac mags on the market that cost less than $13 and this makes it hard to find information on Macs at an affordable price. With the recent boom for Apple with the iMac, Blue and White G3 and the soon to be released iBook, I would greatly appreciate it if you could put more Apple content in your magazine as well as more Apple software and games on the CDs.

Steve Bolger
Internet

Virtual banking

Re: 'Online banking', *APC* September, page 92. As I travel quite frequently I was happy to join my bank's ('Which bank?') online banking service. But due to the fact that when I travel I don't take my home computer or a laptop with me, the service is impossible to use as the program to access my accounts obviously isn't available in Internet cafes.

Our second experience (with St George) resulted in our home computer crashing because, on finishing banking, instead of 'logging out' with the tiniest of buttons at the bottom of the frame, we just closed the window — crash! Of course, it's good practice to 'log out', but as more and more people use the Net with less and less experience this is a problem which should be addressed.

Mike Reynolds
Internet

P-POP is unique to Canon.

ESS · STOP PRESS · STOP PRESS · STO

New BJC-7100 has even more refined PhotoRealism, 25 tonal levels and the

plain paper advantage.

And that's only part of the story.

Because the BJC™-7100 also features water-fast printing, even on postcard type stock, is significantly faster than its predecessor in B&W and up to three times faster for photo quality colour.

But, like all Canon high definition Professional Resolution printers, the story begins with quality.

7-colour process. The BJC-7100 has a seven-colour printing process using both conventional CMYK inks, and lower density CMY inks, plus a new image processing system. The result is not self-styled "photo-printing," but a unique Canon PhotoRealism™ process.

More sophisticated colour in 25 tonal levels. The inks can be mixed and layered to produce up to 25 tonal levels with up to 90 times the colour combinations of traditional CMYK inks. The result is finer colour gradations, richer dark tones and hard to produce light shades are virtually free of pixelisation. So high quality paper produces images that are almost indistinguishable from photographic prints.

Professional Resolution
Ultra-High Definition.

Better plain paper performance. Then there is P-POP (Plain Paper Optimised Printing), a process unique to the new BJC-7100. It bonds an invisible Ink Optimiser to the paper before inks are applied. The inks, in turn, bond to the optimiser. Plain paper text and lines are better defined, colours are more vibrant, tones are sharper, and print-outs become virtually water fast.

P-POP™ Water Resistance

Better paper handling, full bleed A4. Better plain paper use can obviously lower operating costs. It accepts virtually all paper types from plain to high gloss photo paper, has the ability to print full-bleed A4 and even accepts card-stocks at paper-weights up 550 gsm (0.8MM).

Canon Customer Care. All Canon printers feature a one-year warranty, upgrade-able to three years for minimal cost, and are backed by Customer Care hot-line support. Drivers are available for Windows® 3.1x/95/98.

If you need high definition PhotoRealism, even on plain paper, you need the P-POP advantage. To learn more about the new BJC-7100, call us on 1 800 021 167.

Photo Realism™

New BJC-7100 – $599RRP

Canon

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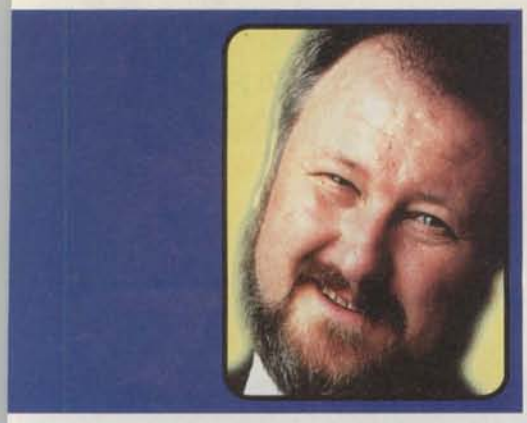

Office 2000 may have a really stupid name, but it has some well-concealed benefits.

By Jeremy Horey

Office 2000

There is still a way to go until the turn of the century, and so I am wondering why I am using a product called Office 2000. Of course, software numbering is driven more by marketing considerations than commonsense.

You may have noticed that Microsoft used to avoid labelling any software with the number 1. This is because first versions of Microsoft software were inclined to contain a number of bugs. Buyers tended to stay away in droves, preferring instead to wait for at least the 1.1 release.

Now version numbers can relate to the year just passed, the current year or the next year. There seem to be three camps among those who name Microsoft products; one is staffed with optimists, one is staffed with pessimists and the other the realists, which, as always at Microsoft, are outnumbered.

Silly naming aside, I have been pleasantly surprised by Office 2000. The transition has been almost painless. Many of the things I have complained about in previous columns have now been fixed.

The installation of the main programs is an improvement on Office 97. However, I had problems installing Photo Editor. Having installed it from the third CD, there was no indication that the installation was incomplete, but each time I tried to edit a picture, the program told me I was missing a file. Eventually, I put the fourth CD in when I was starting up the program and it grabbed the file to complete the installation.

Wouldn't you think that Microsoft could have put all of Photo Editor on one CD? It appears that the number of CDs was more of a convenience for Microsoft than for those actually installing the software. If even half of the 60 million Microsoft Office users buy a full copy of the new version, that is at least 30 million wasted CDs.

The install routine does have its good points, however. For instance, it allows you to leave old copies of the software on your system. This would have been a very useful feature in previous Office versions; it would have helped with the incompatibility between the new and old file formats.

The file format in Office 2000 is very good news. I can send files to Office 97 users and they can read them without any trouble. I've always thought that it shouldn't be too difficult to produce a file format that is compatible with older versions of the same software, but that also allows new features to be added. This should be mandatory for all software.

I like the way programs in the new suite check their own sets of files when they load and can automatically add what is missing. This, too, should be a mandatory feature of all software. A program should be able to keep track of its own parts and manage them.

Office 2000's support for HTML is a plus, although support for SGML would have been better. HTML recognises the move towards more open document formats. So much effort is wasted converting documents and other data between different file formats.

The layout of some of the new applications' main screens has been improved. This may just be finetuning, but it is still useful. I particularly like PowerPoint's new layout — having three different areas on screen simultaneously is a productivity bonus.

There are, however, a couple of things that I don't like in Office 2000. The morphing menus and toolbars should have never made it to release. You can turn them off, but they should come turned off. I like the idea of being able to change the order of the options and even the options themselves in menus, but I don't like the program changing things for me.

I have been pleasantly surprised by Office 2000. The transition has been almost painless. Many of the things I have complained about have been fixed.

The new cursors and icons take some getting used to. Having known the old icons by heart, I now have to look closely at each of the new ones. The only purpose for changing these items seems to be to make sure you know that you are using a new version. This is hardly a sufficient reason to justify the irritation.

Finally, I must congratulate Microsoft. The installation allows you to avoid that rotten paper clip. I didn't have to turn it off this time because it never even made it onto my machine.

Jeremy Horey is a senior consultant with Tech Talk Australia, a division of Com Tech Online. You can contact him at jeremyh@techtalk.com.au.

1440 DPI, Drop Modulation Technology

and Individual Ink Tanks.

If you demand speed, quality and economy from your printer, look no further than the new Canon BJC™-6000.

New see-through ink tanks. What really distinguishes the BJC-6000 is the new ink tank system. For better operating economy there are individual see-through ink tanks for all colours. Each is separate from the print heads, significantly reducing operating costs and allowing you to replace only the empty tank.

The think tank system. Each ink tank has a prism moulded into the bottom. A beam of light measures ink status, and a monitor in the printer driver keeps users up to date on the amount of ink remaining in each cartridge.

More life-like colour. An all-new driver emphasises colours as they are perceived by the human eye. The result is natural colours with more subtle variations in dark shaded regions, and better gradations in highlighted areas. PhotoRealism with a six-colour ink system and Drop Modulation further enhance quality, even on plain paper.

1440 X 720 dpi. Drop Modulation Technology™ generates droplets around one-third the size of conventional droplets giving you high resolution printing at 1440 X 720 dpi. The result is a sharper image with smoother tonal gradations.

Sharper Black Text. Drop Modulation Technology is now available for the first time with a black cartridge to help eliminate grain in text. At the same time newly developed black ink gives sharper, clearer text with improved water resistance.

New, high-performance engine. An innovative new engine design provides the fastest print speeds, in both black & white and colour, of any Canon Bubble Jet printer.

Canon Customer Care. All Canon printers feature a one-year warranty, upgradeable to three years for minimal cost, and are backed by Customer Care hot-line support. Drivers are available for Windows® 95/98/NT and an optional USB conversion kit is available with drivers for Windows 98, iMac and Mac G3.

If you are looking for performance and economy, you've found it in the new BJC-6000. For more information please call us on 1 800 021 167.

Photo Realism™

New BJC-6000 – $549RRP

Canon

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CS/8259

Those seeking retail therapy draw near. The time has come to join the electronic bazaar.

By Helen Dancer

Where the auction is

Until now, the average online auction has been about as appealing to the casual Net surfer as a suburban weekend garage sale, although probably better signposted. When visiting an auction site like eBay, you know that anything you buy will have to be shipped from America. You'd have to want something pretty badly to even make a bid.

There are also concerns over issues such as credit card safety, the legitimacy of the goods for sale and the lack of redress if your your hard-earned money ends up in a black hole. For some, it's been a positive experience — deputy editor Angus Kidman, for instance, picked up Bananarama memorabilia (need I say more). In most cases, however, millions of bytes are spent describing a mass of space junk and other people's leftovers, but at least no trees have died in vain.

Online auctions began as person-to-person transactions, borne from the realisation that the Net enables sellers to reach a far wider potential audience, and gives buyers an opportunity to widen the search for their genre of collectable. According to Stuff Auctions principal Simon van Wyk, the major appeal is the option to describe the thing you want to dispose of in more than 15 words, and to upload a picture when it absolutely defies description.

As usual, however, business wants a piece of the action, or in this case, the auction. Forrester Research predicts that business-to-consumer sales in the auction space will outpace consumer-to-consumer sales by 2002. Currently, business-to-consumer transactions account for about 30% of online auctions, but will represent a solid 66% by 2003.

We've already witnessed companies like Priceline in the US adopt the auctions metaphor for goods and services not traditionally associated with second-hand markets. It acts like a broker, offering unsold hotel rooms, airline seats and even new cars for whatever the market will bear — sometimes well below the standard retail price. In Australia, auctions of accomodation have also become common.

This development signals the transition to what Andersen Consulting's Joe Carter calls the 'electronic bazaar', which represents something far more significant than the deregulation of services or increased competition. It turns the buyer/seller relationship on its head. Sales depend more on what the buyer wants than what the seller has.

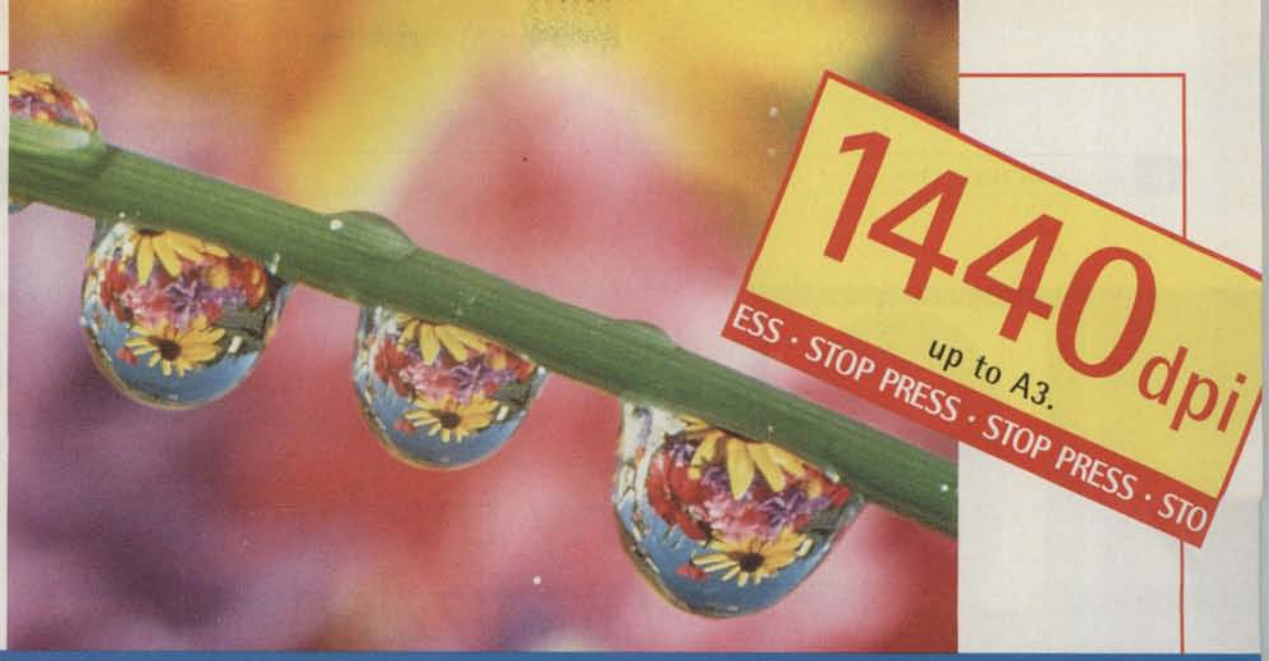
Unlike the traditional seller-centric marketplace, buyers in the electronic bazaar set up the stall and display their 'intention to purchase', and the value they set on those goods and services. It's then up to the passing sellers to judge the value of that opportunity to supply, and determine how closely it matches their own skill set or the goods they have available.

The electronic bazaar is as much about satisfying consumer needs as it is about supplying actual goods and services. Eliminating the need to shop around, it allows buyers to reclaim one of their most precious resources: time.

Carter believes we've shifted the cash register from the market to the home. And just in time too. From 1996 to 2001, IDC predicts there will be a tenfold increase in the volume and value of Net-based transactions. Martin Zonis from the University of Chicago estimates that by 2001 the value of transactions on the Net will outpace 'real world' commerce.

We're at the crossroads, says Carter. We are on the path to ecommerce, but it could lead to 'Me-commerce'.

Helen Dancer is the editor of the *Bulletin*'s e-bulletin section. You can contact her at hdancer@acp.com.au.



1440 DPI, PhotoRealism, richer blacks, exceptional speed, plus

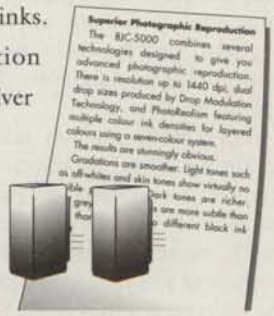
independent cartridges.

The idea of a dual cartridge system has existed for awhile. But needless to say, some systems are better than others. The new BJC™-5000 proves this point.

1440 dpi with variable ink drop sizes. Both the standard colour and optional PhotoRealism™ cartridges use Canon's Drop Modulation Technology™ with variable drop sizes in resolution up to 1440 dpi. The combination delivers smoother colour gradations and far less "grain" on virtually all paper types.

New dual-cartridge system enhances performance. Then, a special dual cartridge system lets both cartridges act independently to complement each other. In "split-page mode" identical black or colour cartridges can effectively double print speeds. Or, using different ink types you can produce exceptional quality effects, with the printer automatically identifying and using each cartridge for the desired result.

90 times more colour combinations. For instance, PhotoRealism inks can be used with conventional inks for a seven-colour ink system, with multiple ink densities per pixel for up to 90 times the colour combinations of conventional CMYK inks. Combined with Drop Modulation Technology the result approaches silver halide quality reproduction.



An all-new approach to black. It uses new, black ink that is blacker than conventional ink. As a result, black & white documents have an exceptionally high degree of finish. Two of these cartridges (BC-23) are included in the box, and may be used simultaneously.

Independent print heads can halve print time.

Professional Resolution Ultra-High Definition.

Print up to A3. Both standard and PhotoRealism inks may be used on all A4 paper types. It will also print up to A3, and supports banner printing to the equivalent length of 6 A4 pages.

Canon Customer Care. All Canon printers feature a one-year warranty, upgradeable to three years for minimal cost, and are backed by unlimited hot-line support. To learn more call us on 1 800 021 167.

Photo Realism

New BJC-5000 – $499[RRP] including 3 cartridges.

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CS/8266

The courts are still deciding if Microsoft has manipulated the browser market, but it seems like no-one cares anymore.

By Angus Kidman

Why the browser wars fizzled

Not so long ago, choosing a browser was much like a religious experience resulting in flame wars, lots of late night downloading and many expletives. I should know, having always been part of the Netscape blind loyalist camp, willing to shoot down anyone who suggested that the Evil One — otherwise known as Internet Explorer (IE) — was the superior product.

This fanaticism was reflected in the marketing of the browsers. So keen was Microsoft to advance its product that it found itself on antitrust charges. This month, arguments will resume in the US courts over whether Microsoft crossed the line in its promotion of IE. DOJ attorneys will again argue that Microsoft exploited its monopoly power to restrict Netscape's access to the market and shore up its own position. Microsoft's lawyers will argue that IE's undoubted popularity is due to its superior features, speed and integration.

No doubt there are some who still have strong feelings, but the whole browser popularity argument now has a definite feeling of ennui about it. Research companies no longer bombard us with details of which company has gained half a percentage point in the race for corporate market share. The browser update rate has also slowed; having the latest point upgrade no longer seems as crucial.

That's not to say that people don't still care about which browser they use, but it's not the burning technical issue it was 12 months ago. Recently, I've been reflecting on why that might be.

It can be partly explained by the spread of the Internet from the technically conscious to the mass market. Those not of the 'it's 10 days old, get rid of it!' school of thought clearly aren't concerned by the brand to that extent. To them, a browser is a browser is a browser. Microsoft's choice to include IE as part of Windows does, however, mean that many will never consider Netscape, or any of the more esoteric alternatives such as Opera.

But the main reason the browser wars have died down is there's just not much more room for improvement. I can see a lot of differences beween the current version of Netscape I'm using (4.5) and the one I started with (2.0). However, when you compare it to the previous version, there's practically no difference. The way I use the products hasn't changed one iota either. The minimal differences make even the trying-too-hard office suite market look like it's making progress.

The beauty of the browsing experience is that once the fundamentals are in place you don't need anything else. It's easy to learn (I've been far more successful teaching people to browse the Web than to do something as basic as saving a file onto a floppy disk), and no-one wants it to be overly complicated.

The failure of the channels concepts, which were the main selling points of the 4.0 models from Microsoft and Netscape, proves the point. In theory, channels (self-downloading, ready-to-subscribe Web offerings) sounded like a good idea. In practice, though, they don't line up with how most people (still) use the Web — intermittently, during scheduled periods, rather than throughout the day. In my job, I do use it throughout the day, but channels aren't much use to me.

Neither of the major offerings is ideal, of course. They can hardly be described as a paragon of stability for one thing, and there is little to separate them in this regard. Netscape is prone to crashing slightly more often, but at least when it does, only the application dies. If IE dies, you're looking at a one-way ticket to Reboot City. Until an entirely new concept emerges, however, browsers aren't going to change much.

What ties us to one browser can be a highly individual experience. I told myself that I didn't like IE because all my bookmarks were carefully organised and ready to access in Netscape, but eventually I realised that wasn't true. What bugged me was that the Esc key, which I often use to stop a page downloading a superfluous graphic, didn't work properly in IE. I'd swear and scream at my keyboard in frustration while my hard disk and modem light whirred furiously. No browser, no matter how fast, was worth that much angst. I've checked in with IE occasionally since, and my feelings remain unchanged. No decent Esc key, no dice.

No doubt there are some who still have strong feelings, but the whole browser popularity argument now has a definite feeling of ennui about it.

Angus is the editor of *APC's* Newswire service, and deputy editor of *APC*. You can contact him at akidman@acp.com.au.

Australia's most popular printer for home and small offices combines exceptional value, with outstanding performance.

Use 75% less ink. Super Economy mode reduces ink consumption by 75% compared to Standard mode, and works for both black and white and colour. Combined with an optional high capacity, black ink cartridge, it can print up to 2400 pages in black and white, and up to 400 in colour using standard inks*. That's anywhere from two to five times the output of any direct competitor!

Photo quality printing. There are three colour print modes – Normal, Fine and Photo. Photo mode emphasises highlights and contrasts, and improves half-tones by producing richer blacks. Or, using the optional black ink cartridge, you can convert the BJC™-265SP to a fast B&W printer.

Brilliant colour, super economy, optional PhotoRealism, better Internet printing,

all for just $149.

Optional PhotoRealism™ To this Canon adds the option of PhotoRealism inks, for photographic reproduction approaching silver halide quality. It produces up to four times the colour combinations of conventional CMY printers, for smoother colour gradations and more accurate colours in skin tones and other light shades.

Better Internet images. Image Optimisation takes low resolution Internet images (typically 72 dpi), and prints them at the highest resolution supported by the printer to reduce jagged edges and pixelisation.

Canon Customer Care. All Canon printers feature a one-year warranty, upgradeable to three years for minimal cost, and are backed by Customer Care hot-line support. Drivers are available for Windows® 3.1x/95/98 and Windows NT. The BJC-265SP offers exceptional operating economy plus high quality colour printing, for just $149. For more information call 1 800 021 167.

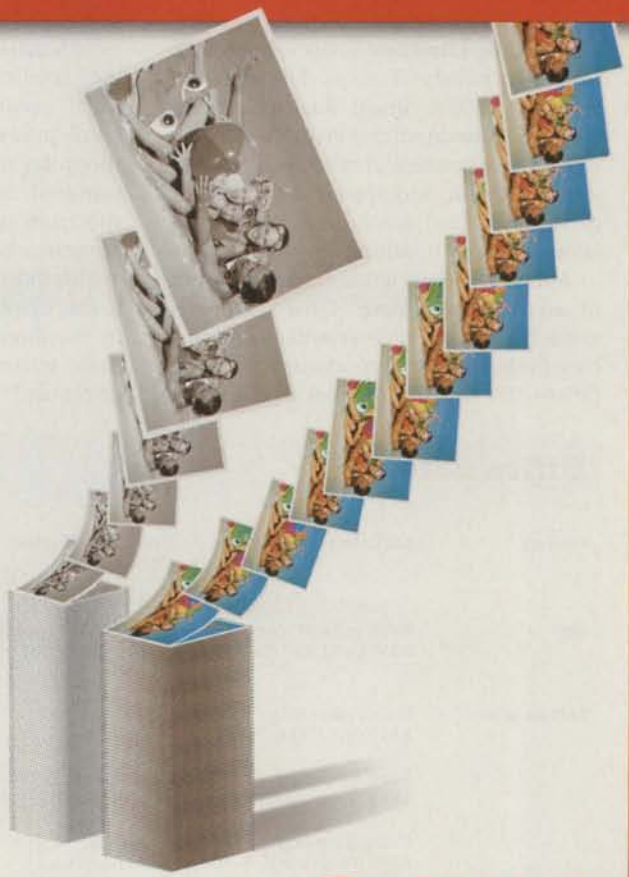

Photo Realism™

BJC-265SP colour Bubble Jet™ printer – $149RRP

Canon

* Based on 5% page coverage for B&W and 7.5% coverage for colour, Super Economy not available with PhotoRealism inks. Price shown is the recommended retail price including tax. Canon and the Canon logo are registered trademarks and BJC, Bubble Jet and PhotoRealism are trademarks of Canon Inc. Windows is a trademark of Microsoft Corp. in the U.S. and other countries. Canon Australia Pty Ltd, ACN 005 002 951.

CS8409

Office suites are changing all the time, so Price Watch decided to investigate their value.

All you can suite

There was a time, not that long ago, when you could expect a new PC to come bundled with an office applications suite. Depending on where you buy your system — a reputable dealer or a fly-by-nighter — this could vary from Office Small Business Edition to a dodgy DOS-based text editor and an instruction sheet on how to use the Windows calculator. But the times, as they say, are a-changing, as Price Watch discovered when we investigated current office suite prices.

Competition between office products has never been so fierce. The major players are laying out their 2000-suffixed product lines to eager consumers, many of whom may not have upgraded for quite some time. Price Watch did the rounds to see what is available at a variety of retailers.

There are essentially three major players — Microsoft, Corel and Lotus — each with their own variety of suites. Microsoft, for example, offers Small Business (SBE), Regular, Professional and Premium editions of Office. Regardless of what you need (a word processor and spreadsheet, or Web design tools and databases), it's vital to know what you're getting for your dollar.

Microsoft clearly leads the field in terms of ease of purchase. Office 2000 is available just about everywhere and you can probably pick up cheap copies of Office 97. Corel's market presence is mainly due to it being bundled by retailers such as Gateway. Lotus SmartSuite is the cheapest of the lot, but oddly enough appears to have little market presence. Although Price Watch found it at the Internet shopping level, there was little evidence of its existence in retail outlets, apart from a few OEM (original equipment manufacturer) bundles.

Price Watch found plenty of evidence of upgrade mania. A lot of systems already have office suites installed, and it's a tough sell to get someone to pay $500 or more for a new version of a product they already own — hence the upgrade path. To make things even trickier, a lot of so-called 'upgrade' versions will upgrade from any office suite, not just their own. This is another potential incentive to change suites, and a sure-fire way to save money.

When it comes to office suites, we found that retailers pay scant attention to the word 'recommended' in recommended retail prices (RRPs). It's definitely worth shopping around. Prices can vary by a hundred dollars, but both ends of the spectrum are still well under the RRP. Bargains, however, come at a cost. Price Watch didn't find a lot of sales staff willing to talk up office suites, most just pointed us in the direction of the nearest Microsoft rack, mumbling about how good their prices are.

About Price Watch

Each month, Price Watch examines variations in retail pricing and service. Investigations are conducted anonymously, either by telephone contact with retailers or through pricing details supplied on their Web sites. Prices and specifications provided here are as quoted by retailers; while we assume these are correct, we cannot accept any responsibility for errors and omissions. The responsibility rests with sales staff to provide adequate information, as their employer would expect them to do with every customer. Readers are advised to always obtain a written quotation prior to making any major technology purchase.

Another option, as we mentioned earlier, is to purchase a suite with your next PC. Microsoft Office used to be the absolute standard, especially if purchasing from a major supplier. Because PC competition is heating up, however, profit margins have slimmed and the inclusion of Office as a freebie has all but disappeared. You're more likely to see Corel Office, Microsoft Works or nothing at all. If suite compatibility with your workplace is important, it is still possible to save significantly by purchasing an OEM office suite when you purchase your PC. We were able to knock $200 off the price of Lotus SmartSuite for the OEM product. Remember that these should only be sold bundled with systems, so if you need the package alone — tough.

OEM isn't the only way to save money on office suites though. The major players offer academic discounts on their packages, and once again Microsoft is the most heavily hyped in this area. The Co-op Bookshop's price for Office 2000, for example, is roughly a quarter of Microsoft's RRP. That's a big saving — especially on a student's budget.

Of course, if you're a home user, you could always download StarOffice (http://www.stardivision.com/) and use that free. Just a thought, mind you.■

Office suites

Product	Microsoft Office 2000	Corel WordPerfect Office 2000	Lotus SmartSuite Millennium Edition
RRP*	$459 to $639 (upgrade) $859 to $1,339 (full)	$249 to $349 (upgrade) $580 to $649 (full)	$299 (full)
Sample prices	Forte Computing $350 (SBE OEM)	Harris $479 (full)	Computermarket.com.au $45 (OEM)
	Adelong Computers $915 (Professional full)	International Software Warehouse $259 (upgrade)	Co-op Bookshop $99 (academic price)
	Co-op Bookshop $289 (Professional, academic price)	Grace Bros $249 (upgrade)	Harris Technology $253
	Frank's Compware $535 (Professional upgrade)		

*RRPs listed above may vary according to package options taken

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amazing value for money.

The new BJC™-2000SP proves that beauty can be more than skin deep.

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Introducing Automatic Image Improvement. Canon has developed a way to automatically improve less than perfect digital images, without needing colour balancing and re-touching. It's called Photo Optimiser. This new, selectable driver function automatically adjusts for defects in exposure, highlights and shadows, without affecting the original file in the computer.

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Brilliant colour. To further improve images, Drop Modulation Technology™ with dual drop sizes for smoother colour gradations works on all paper types. Then, for the gold standard in photographic reproduction, Canon's PhotoRealism inks[1] vary the saturation per pixel so that a single dot could have 0%, 33%, 67% or 100% of a colour. This produces up to five times as many colour combinations as conventional CMYK inks, with better half-tones and almost no visible grain, even in areas of low colour density.

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Canon Customer Care. Canon Australia supports the BJC-2000SP with a one-year warranty, upgradeable to three years for minimal cost, and is backed by Customer Care hot-line support. For more information call us on 1 800 021 167.

Photo Realism™

New BJC-2000SP colour Bubble Jet™ printer – $199RRP

Canon

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If you have a complaint, don't muck around — go straight to the top. **By Roulla Yiacoumi**

Whinge and be heard

Business leaders were told at a recent customer service seminar that they should be grateful for complaints — even encourage them — because it is free customer feedback that could be used to improve their bottom line.

After the dumbfounded business heads picked themselves up off the floor, they listened, but only half-heartedly. Most of them were probably thinking, 'Who in their right mind would actually encourage whinging customers to be vocal?' In the post-presentation question segment, one company representative suggested that asking for complaints could leave a business open to legal action as it may be seen as an admission of having a problem.

Truth is, there's no such thing as a perfect company product. There will always be faulty items in the marketplace, despite company efforts to produce high-quality, trouble-free goods. The problem for business should not be keeping customers quiet if they end up with a dud, but how to quickly resolve the problem and ensure the customer remains happy and loyal.

The results of our annual Hardware Service & Reliability reader survey were published in *APC* July (see page 82). One of the survey's most interesting findings was that while almost half the respondents said their IT equipment had been unusable at some stage, over 70% would buy equipment from the same manufacturer. Of course, this is an extremely high figure, but it still means almost a third of respondents will consider other options when it comes to a second purchase.

It costs businesses up to 10 times as much to secure a new customer as it does to merely hold on to an existing one. If a third of customers aren't coming back, it should be asked why vendors aren't doing everything they can to secure those customers.

This may come as a shock to some vendors, but customers do not complain because they have nothing better to do or because it brings them great joy.

The letters *APC* receives come from readers who are at their wit's end. They are extremely unhappy with a business' lack of interest or unwillingness to correct a problem, and write to *APC*'s Service & Reliability column as a last resort. They plead for help.

This is why, as part of our survey, we also asked readers to tell us about the worst IT product they have ever bought. We published a selection of these responses so that other readers could read about the experiences of fellow IT users.

Unlike the (unnamed) manufacturer that contacted *APC* to complain about one of the negative comments made concerning its products, Compaq responded positively to one reader:

Dear *APC*,

In the Hardware Service & Reliability survey results published in the *APC* July 1999, you published my response in the section 'What is the worst product you have ever bought?' I related the short story about my Compaq Armada 4110 notebook. The keyboard died after three weeks and I had to pay for the repairs. Compaq said the warranty did not apply even though I purchased it new. I thought you may like to know what happened when Compaq read your article.

I also own a Compaq Presario 2276 desktop. A few weeks ago, I was having problems with it and got into an argument with the Compaq engineer here in Tamworth. To cut a long story short, I decided to put my concerns down on paper and convey my thoughts to Compaq directly. Compaq read both your magazine and my 'concerns' and arranged to have my Presario 2276 fixed without delay. They also arranged to have my Armada 4110 shipped to Newcastle. The new keyboard was to be fitted when the customer service department called to let me know about the cracks in the notebook casing and the broken screen hinges. I informed Compaq that the Compaq agents at the time (not the current one) refused to fix it. Compaq offered to supply and fit new screen hinges and the casing at no cost.

Sometimes you may get stiffed on a product. But if you go beyond the local dealers and confront the manufacturers of the product, you may be delightfully surprised. Don't let the local dealer or engineers spoil a good product.

If you want service for a product you paid for, go straight to the top.

James Ringhof
South Tamworth, NSW

While Service & Reliability applauds the actions of Compaq, it should be noted that this complaint was acted upon only after the reader had a second problem with a Compaq product, and after the initial complaint was brought to the attention of the company once it was published in *APC*. My guess is, though, that Compaq has earned itself a satisfied customer who may even buy Compaq products again, and who will certainly praise the generous actions of the company. The subject of the current inquiry into radio 'advertising' aside, you can't buy that kind of endorsement.

Have you ever had a problem with a local dealer, only to get a different response after writing directly to the company? Was your problem eventually resolved and would you buy products from that same manufacturer again? Email me at ry@acp.com.au or write to Service & Reliability, *APC*, Level 8, 54 Park St Sydney, NSW 1028. Letters are subject to editing. We regret letters cannot be personally answered.

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Drop Modulation Technology.

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Cable-less communication.

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If you need help choosing between small, and smaller, give us a call on 1 800 021 167.

Canon portable colour Bubble Jet™ printers

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CS6019

Trying to retain IT staff? Maybe it's time to start retraining them.

IT's new labour philosophy

Information technology is one of the world's fastest-growing industries, constrained only by the seemingly insatiable demand for expertise — a demand that is expected to grow significantly in coming years. But not only are IT professionals becoming increasingly difficult to come by, changing attitudes towards employment mean employers are struggling with staff churn, which is now measured in months, not years.

A recent Net survey of workers by online recruitment agency Top Jobs on the Net confirms that most employees do not believe their current job is long-term. Sixty percent of the more than 300 survey respondents — about 20% of whom were in IT positions — planned to stay in their current job for less than two years. Just over half expected to leave sometime in the next 12 months. Surprisingly, some 57% of the respondents weren't even sure they wanted to stay in their current position and industry.

These results were confirmed by recent figures from research company IDC Australia, which concluded that 26% of Australian IT staff leave their jobs every year.

These rather worrying figures highlight the labour market's growing instability. In the IT industry this is being fuelled by the skyrocketing salaries now offered for ecommerce and other sought-after skills. Intense competition among major employers has put control of today's labour market into employees' hands, yet many industry observers believe employers could engender more loyalty by treating their staff as an investment instead of just a resource.

An annual training survey recently completed for IT training company Com Tech Education Services sheds more light on rising employee movement. While moves between companies usually involve salary increases, the survey of 517 Com Tech students found that nearly 70% believe the potential to gain additional training is more important than a competitive salary.

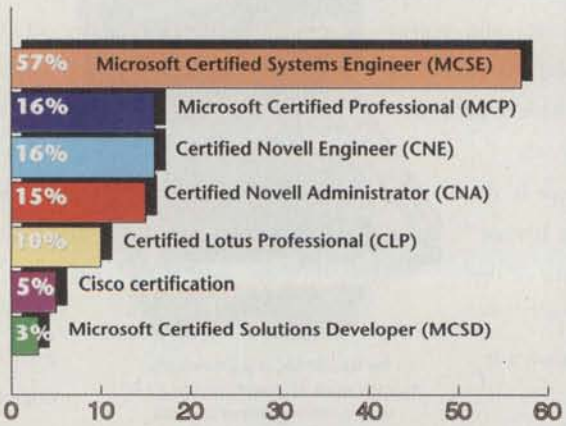
"It is an employer's market out there," said Anton Muller, group network and communications manager with general insurer FAI Insurance. "Loyalty is only ever as good as the employment package, and increasingly employees are demanding relevant, ongoing training as part of these packages. Like all IT departments, we have been put in a position where we have to invest more in training our staff in order to keep them."

But here's the rub: employers know that training employees makes them more desirable to competitors, and many hesitate to invest thousands of dollars to upgrade their employees' skills, knowing that they may lose them in a matter of months.

"There are two mindsets in the industry," said Bernard O'Bree, business development manager with specialist IT recruitment company Computec International Resources Australia. "Some people enjoy the challenges of new technology, while other people enjoy the challenge that their existing technology and business brings. Those that are constantly seeking a new fix have to reinvent themselves. But companies don't want to reinvent themselves."

O'Bree, who believes Australian employers are "grossly underpaying for the talent that's in the market at the moment", often has to look overseas and offer generous incentives to source more obscure IT skills for Australian employers. Most Australians with such skills, he said, have left the country in pursuit of higher salaries.

Most popular technical certification



Source: Com Tech Education Services Third Annual Training Survey

The problem is even worse for small to medium enterprises (SMEs), which often lack not only the funds for salaries but also to provide education. *The IT Engine Room*, a July 1999 report by the National Office for the Information Economy, recognises this problem and recommends the creation of 'executive warehouses' that will give SMEs access to the IT skills they need.

Monty Sachdev, CEO of staffing company Unisys People, suggests that many companies may be able to reduce problems related to staff turnover by outsourcing some of their IT infrastructure. Mass adoption of this approach could, he adds, eventually consolidate IT expertise in the hands of major outsourcing companies — and in so doing, normalise the IT skills market.

"Businesses themselves are going through such shake-ups that they can't offer long-term stability to employees. But when companies are outsourcing contracts, they're passing on the people-related problems too. When the options [for employees] narrow, that's when the push from the seller's side will start to diminish," said Sachdev.

However, the likelihood of strong-arming IT workers into an IT skills oligopoly is doubtful. For now, says Top Jobs on the Net managing director Graham Sharp Paul, companies may simply have to give in, invest in training their staff and hope they stick around to make the investment worthwhile.

"Companies invest in computers to upgrade them, so why not their people?" he said. "If you're in an industry where there's massive technical change, you can't treat people that way. They must be encouraged, developed, trained and invested in. [Losing staff] is a risk companies have to take. You need to invest in your people and make that a conscious policy of your company. You have to create a sense of ownership within people regarding the company you work for. [If you can do that] you give yourself the best chance of developing a really good relationship with your people, and having them reciprocate."

David Braue

Canon's patented new LIDE technology helps these new scanners

break the price/quality barrier.

Reinvent is the most over used word in the computer business. But this time it's true. Canon has just reinvented scanners.

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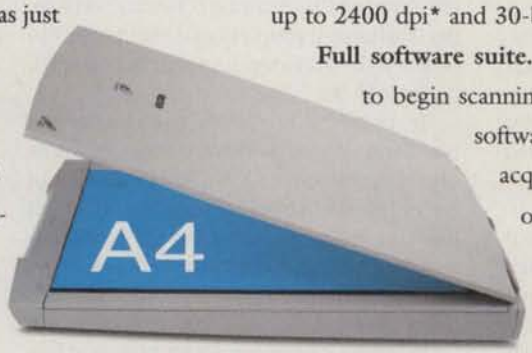

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LIDE LED Indirect Exposure

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Web businesses are booming, but not all have taken the time to ensure their business is on a firm legal footing.

Web developers and the law

Australian Web development businesses have excellent technical and creative skills. However, these skills will not count for much if the business is not structured and managed to minimise legal risk.

Many Web development businesses commence life as sole traders or partnerships. Although these business structures are convenient and generally inexpensive to create, they are generally not platforms upon which long-term success can be built.

A sole trader, as the name suggests, is an individual that runs a business alone. That person receives all the income of the business, but is also personally responsible for all the liabilities of the business. If two or more individuals join to establish a Web development business, the business may be deemed to be a partnership.

A partnership is attractive to Web developers because two or more people can pool resources to establish the business. However, things can become very sticky. The worst aspect of a partnership for many people is joint and several liability. Joint liability means that all partners are *equally* responsible to pay the debts of the business. Several liability means that all of the partners are also *individually* responsible for all the debts of the business.

If I the am the only solvent individual in a three-member Web development partnership and we are successfully sued for $15,000, the plaintiff can recover this amount from me alone (this is the burden of several liability). Of course, I can attempt to recover $5,000 from each of the other two partners because of their joint liability, but this would be pointless if they don't have assets. Another problem with both sole trader and partnership structures is that income received under those structures is subject to personal income tax rates.

To overcome the problems associated with these structures, many Web development businesses establish companies. Company structures enable the shareholders to generally avoid personal liability for the debts of the business. The profits of the company are also taxed at the company tax rate of 36%, rather than at (potentially) higher personal income tax rates.

A company can be set up in such a way as to provide strong protection for one of the most valuable assets of a business — intellectual property. In the absence of an effective holding/trading company vehicle, the intellectual property of a business could be lost if the Web development business fell on hard times.

In order to minimise the chances of hardship, Web developers need to know about employment law. The definition of an 'employee' varies, depending on which law you are considering. For example, the superannuation and payroll tax laws provide different definitions of the word 'employee'.

Whether a person is an employee at law is crucial in determining a business' responsibility for matters such as PAYE tax remittance, superannuation payments, payroll tax, and workplace health and safety. If the employee issues are not resolved when a Web development business swings into action, the business could suffer a legal body blow in the form of fines and penalties under relevant legislation.

The ownership of intellectual property is another issue that is affected by employee/contractor issues. The ownership of intellectual property usually vests in an employer if an employee creates it in the course of their duties, which can be defined quite widely. On the other hand, if a contractor creates intellectual property, they are normally deemed to be the owner of that material.

These positions can be partially or completely altered by parties to a contract. But it is still essential that the relationship of the parties is properly characterised when such a contract is entered into.

Another compelling reason for sorting out the employee/contractor issue is the principle of vicarious liability. Under this principle, an employer is responsible for all wrongful acts of its employees if those acts are carried out during the course of the employee's duties. This is not the case with a contractor.

When you find a good employee, how do you keep them? In the US, many startups offer employees shares as an incentive to stay with the company. This has proved attractive in the US (74% of all US companies with annual turnover under $US50 million offer share options) because of its low capital gains tax rates.

Unfortunately, employee share option plans are unattractive in Australia for two main reasons. First, our capital gains tax rates are higher than those in the US. Second, Australian employees are reluctant to take up share options because they are taxed on the difference between the share value and the option price, either at the date of the grant of the option or at the date the option is exercised. This generally means an employee is taxed before they receive any real profit. Further, this paper profit is subject to tax at higher marginal rates for ordinary income rather than at a special capital gains rate. The Federal Government is making noises about changing this situation, but it is unclear when such changes may take place.

The message of this column is simple. The type of business vehicle you choose will, to a large degree, determine how far you travel down the path to success. Plan carefully and success is much more likely.

Leif Gamertsfelder

Leif Gamertsfelder practises at Deacons Graham & James based in Brisbane. He can be contacted at leif.gamertsfelder@dgj.com.au. This column is intended to provide general information only and should not be relied upon as a substitute for legal advice.

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The merger of toys and technology promises an interesting future for our children.

Toying with technology

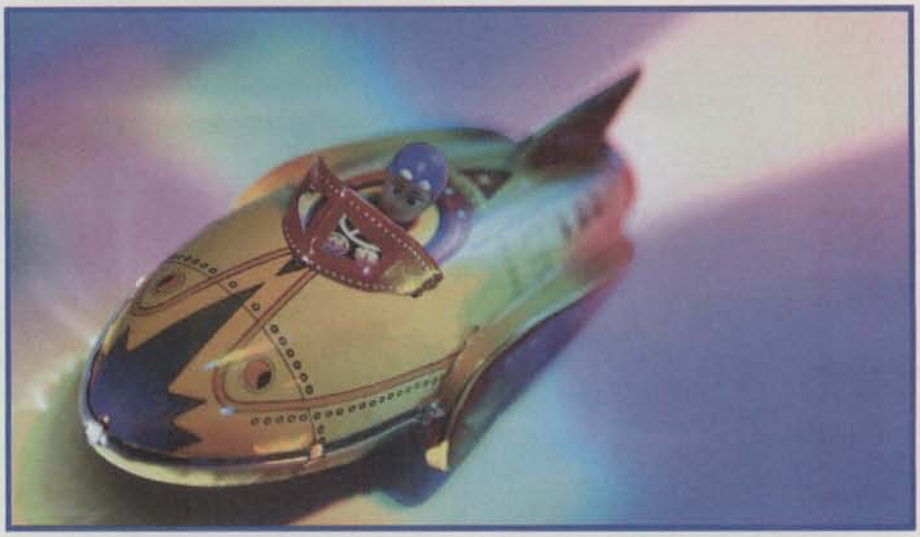
Barbie doesn't sell like she used to, but the well-groomed, hourglass-figured doll has branding power. Mattel, the world's largest toymaker, recently announced that Barbie-theme computers will soon be on the market in the US. Theme-based systems don't end there. Mattel's licensing agreement with Patriot Computers also includes PCs with Hot Wheels themes. The $US599 'toy' computers became available in the US last month. (The products may be launched in Australia if they are successful in the US.) Each system includes a 333MHz Intel Celeron processor, Microsoft Windows 98, 32M of SDRAM, 3G hard disk drive, 56K modem, 15in monitor and speakers.

More important than the specifications, however, is the theme. The silver-coloured Barbie computers have pink and purple floral accents and come with Barbie accessories and a range of children's software, including typing, fashion design, maths and creative writing products. The blue and gold Hot Wheels PCs will promote the "power, speed and performance of the brand", according to Mattel. The software for this package includes car design, Pioneer adventures and maths products.

The branding theme and concerns about gender-based products have been part of toy manufacturing for some years. However, this is the first attempt by a toy company to offer branded PCs specifically targeted at children. Will the toys we enjoyed as children still be around in the future, but in a different format? Price points are now low enough to enable technology to be used extensively in products for all ages. Technology is becoming so crucial to work and play that it is being marketed to increasingly younger age groups.

The emergence of brand-based toys has caused some concern. Educators have advocated less concentration on marketing and more emphasis on how the toys will be used. Similarly, they have concerns about adding technology to toys. Technology may open up possibilities for kids to do things they can't otherwise do, but it needs to be open-ended.

"I am not so much concerned that toys now include gadgetry, but I do care about what that gadgetry does, and what type of play it encourages," said Toni Downes, associate dean of the education faculty at the University of Western Sydney. "A toy should encourage dramatic play and imagination rather than imitation."



Toys are being developed to interact with PCs, the Internet and each other, and traditional games, such as chess and draughts, are being translated into new formats. Some of these new toys, however, are more accessible than others.

Sony's $US2,500 AIBO robot dog is the techno equivalent of buying a mini-Ferrari. Capable of autonomous behaviour, AIBO has built-in feelings and instincts, and the ability to learn and grow, according to the Sony Web site. Its aim is to bring humans and robots closer — the more time you spend with it, the more it learns and grows. AIBO's price has not stopped 2,000 limited edition units selling out in the US.

A cheaper alternative is Lego's range of Mindstorm products. Its Robotics Invention System, which retails in the US for $US200, allows kids to build working robots.

Even more fantastic toys are on the way. Last year the Massachusetts Institute of Technology Media Lab began a five-year research program, Toys of Tomorrow (TOT), to explore ways technology can transform toys and play. Companies such as Intel, Mattel, Acer, Bandai and Lego have joined the TOT consortium.

TOT believes that children have their best ideas and make their best connections with other people when playing. It also believes that technology has an integral role to play.

The TOT team believes toys and the kids that play with them will lead the way in making all objects smarter. "In the past, new technologies were born in the workplace, and ended up in toys. In the future, toys will be the trendsetters," the site states. "Toys must be engaging, intuitive, indestructible. Long after Windows 95 flickers out, toys and stories will survive."

TOT plans to explore musical toys, outdoor toys, toy stories and toy channels. Its Web site outlines some future possibilities: "Imagine a toy piano that sounds like a Steinway, a stuffed toy that sings lullabies, or an opera that is performed by a cast of toys while children play with them."

Storytelling, a popular pastime with children, could also be enhanced by technology. "Kids use toys to tell stories. Until now, toys have either had nothing to say in return, or they've hogged the conversation. Imagine a toy that asks about a child's day, listens to a child's story attentively and asks questions."

The way toys are distributed may also change. "They will move from old media to new, from movies and TV through invisible networks to toys. The digital source of cartoons will zip straight to the toy factory, be extruded into toys . . . and the toys themselves may be smart enough to tell the FedEx courier where to take them. When the toy arrives, it may even tell the child the story of its journey," TOT suggests.

Selina Mitchell

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Entry Guidelines

(Please ensure you read and understand these guidelines)

1. The Small Business Show Software Awards are open to Australian software companies and software developers of business applications. Subsidiaries of overseas companies or their employees are not eligible.
2. The awards are open to all major platforms:Windows, Mac O/S, Unix and OS/2.
3. Each entry must include the entry form, a full operating set of the software and any appropriate manuals or support materials. You may send a demonstration disk in addition to the full operating software for information purposes only. However it will not be considered for the judging process, Internet applications must be submitted on 3.5 inch disk or CD-ROM. Internet applications will be judged online, ensure correct URL is included in entry.
4. The Small Business Show reserves the right to return each entry software package for consideration for future stories for the program and therefore will not be returned to the entrant. For this reason we suggest that each entrant ensures they retain original disks and manuals.
5. Entries must be received by The Small Business Show no later than 5pm Monday November 8. This is an absolute deadline. Entries received after this date be ineligible for judging.
6. All individuals and companies who entered the Awards in 1995, 1996 and 1997 are eligible to enter again this year.
7. Employees of the Nine Network and Australian Consolidated Press or any associated companies and their families are ineligible to enter the competition.
8. The software will be judged on it's functionality, local and international market potential beginning with ease of loading, it's system requirements and performance. Ultimately, the judges are seeking a product with worldwide market potential.

A representative of The Small Business Show or the judging panel will contact you if further information is necessary.

Entries close strictly at 5pm, Monday, November 8. All entries are maintained under strict security. The finalists will be announced on the Nine Network's The Small Business Show on Sunday, November 28. The winner will be announced on Sunday, December 5. Send your entry to: Software Awards, The Small Business Show, Nine Network, P.O. Box 27 Willoughby, NSW 2068

Entry Form

Full name of applicant/business: _____

Name of software package: _____

Format/platform: _____

Business Address: _____

Tel:Fax: _____

Contact name: _____

Entry category:Main ☐ Main & Internet ☐ Australia-Specific ☐

Name/s of developers: _____

Time frame and Location of development _____

Is software package north market (tick answer) YES ☐ NO ☐

Brief description of software package, it's application and the market for which it has been created: _____

Website address: _____

Declaration: I/we agree to accept the entry criteria set for the Business Software Awards and that the decision by the judging panel is final. Managing director/general manager/director (print name and sign)

Signature: _____

Date: _____

The power of speech

An interview with Dr Janet Baker

Dr Janet Baker, co-founder and CEO of Dragon Systems, built a multinational company from scratch. The pioneer of continuous speech recognition talks with **Simon Vandore** about typing, doing it without venture capital, artificial intelligence and the mechanics of getting ahead.

"Open the pod bay doors, HAL."
"I'm sorry Dave, I'm afraid I can't do that."

This exchange from Stanley Kubrick's film *2001: A Space Odyssey* is probably the most famous example of spoken interaction between a user and a computer. It was filmed as pure science fiction, but today it is technologically feasible. Although it's unlikely that NASA is working on its own HAL, the people they'd most likely consult would be Drs Janet and Jim Baker, founders of Dragon Systems.

The Bakers met when they were graduate students at Rockefeller University in the 1970s. They transferred to Carnegie Mellon University to pursue what Janet Baker calls "the alchemy that would turn speech into text". After working on a five-year, $US50 million speech recognition task for the Defense Advanced Research Project Agency (DARPA), the pair entered the commercial world via IBM and Exxon, applying their experience to office automation.

In 1982 they started Dragon Systems with their own money. After 15 long months they were still working for a token monthly income of $US100. The Bakers were determined to overcome a particular obstacle — people primarily communicate through speech, but when they want to interact with machines, they are confined to hitting little plastic keys.

Today, Dragon is still privately owned (recent plans for a $US100 million Nasdaq float have been delayed). The company has pioneered continuous voice recognition with Naturally Speaking, employs more than 325 people, and claims to hold 60% of the retail market. The Bakers have also managed to raise two children and have "extremely competitive" incomes.

Mathematician Jim Baker has retreated to his research lab as chief technical officer. Biophysicist Janet Baker is the chairperson and CEO of Dragon Systems, an industry spokesperson and an international folk dancer — dancing is a favourite pastime, even though she works 65 to 80 hours a week.

Starting a company without venture capital was not easy. Once Dragon began to turn a profit, the Bakers' salaries were often ploughed back into development. "People think in the US everybody has venture capital," said Janet Baker. "It's not true. We are an anomaly even in the US. But that does mean you have to satisfy your customer, which is not a bad discipline!"

And there are now plenty of customers. The three biggest groups in Dragon's customer base are doctors, lawyers and businesspeople — many of whom would otherwise rely on dictation and human transcription. People with physical disabilities, those who have suffered from repetitive stress injury (RSI), and those who simply want to avoid that risk are other obvious markets.

Baker puts the average worker's typing speed at 20 to 40 words

per minute, so in theory there are significant advantages in putting in the time and effort to train a voice system. "In any office there are people who are much faster than that, and there are also people who are much slower than that. But we talk at 80 to 150-plus words per minute. Now that there are [voice recognition] systems that can keep up with somebody talking in real time, transcribing as fast as they talk, it's pretty exciting. Once people are pretty well adapted, their error rate is pretty low . . . You don't have to over-enunciate, but you do have to be what we call a cooperative speaker. On that basis people really can produce text with careful speech."

Doctors are notorious for their illegible handwriting, and speech recognition can help solve this problem. It can also serve the more important medical function of ensuring accuracy in medical reporting.

"Some very nasty accidents happen when people can't read handwriting," observes Baker. "When people transcribe text, for example, in radiology reports, you know what the most common error is? For a human transcriber, it's the omission of the word 'no' as in 'evidence of cancer'."

Law practitioners are also realising the potential of continuous speech recognition. In some areas of the Australian legal system, the difficult job of the shorthand typist has been made a little easier with the 'stenomask'. The stenographer simply repeats everything said in the courtroom for instant transcription by computer.

Dragon has also worked on text-to-speech systems, but is not developing computers that can talk back using artificial intelligence. Despite its antisocial tendencies, plenty of science fiction fans would give their right arm to have a conversation with HAL, but Baker doesn't see this happening in our lifetimes, nor does she see a need for it. Speech output can use different voices to affect mood, but actual personality and reactive conversational skills are not yet in Dragon's plans.

When the company wants to impress its audience at trade shows, it performs a popular stunt. It poses a contest between the fastest typist in the room and a demonstrator using Naturally Speaking. A volunteer picks an article at random from the day's newspapers and the demonstrator reads it while the local typing champion tries to enter it faster. So far, Baker claims a 100% success rate for Naturally Speaking. Clearly this relies on a well-honed software installation and a demonstrator with a clear, ordinary accent.

Speech recognition products are often far better suited to North American accents, but Dragon's products now support American English, World English (with various speaker types, such as Indian-accented English), French, Dutch, German, Italian, Spanish and Swedish. A Japanese version of Naturally Speaking, recently demonstrated in Tokyo, has enormous potential for productivity in a country where typists normally produce only five to 10 complex Kanji characters per minute.

> "If you're really committed to doing something and are willing to work hard, there's no reason why you can't accomplish it."

"The engine itself is language-independent," said Baker. "It has data structures in which are embedded the different sounds of the language, the different speaker characteristics, the different lexicons, the different pronunciations, the different language statistics . . ."

Baker has a pleasant, mid-US accent, but her busy academic mind sometimes causes her to speak quite fast, blurring the last few syllables of a sentence. At other times she chooses her words very carefully, often revising the beginning of a key sentence after reaching the middle (you can almost hear her say 'back two, select word, paste'). This would surely make her a great tester for her own product, but what if she was a proud North Queenslander?

"If somebody's further out from the median, it'll take [the software] a little longer to adapt. But it does it automatically. When you start, you read some material to it, and that way it adapts its general model to what we call a speaker-independent model, so it can better recognise how you speak. Because everybody speaks differently — that's how we recognise people's voices as a matter of fact."

Not the Dragon lady

Baker admits Dragon needs to do "a progressively better job" of recognising the Australian accent, but insists the company has a special relationship with the Pacific rim.

"Our applications people always love to work in Australia, because of the innovation [there]. And I think it's just a general pioneering spirit and a sense of self-sufficiency that has been lost in other parts of the world."

The qualities Baker mentions would also be required of a female CEO in a male-dominated industry. Baker's advice to other women is to avoid worrying about what others think of you.

"I don't think I have many foes. But you have to do the same job regardless of who you are. You focus on doing your work. If somebody comes up and has trouble dealing with you because you're fat or thin or female or black or whatever it is, you have to find somebody else to deal with them. You're not going to change them. You have to go with the flow."

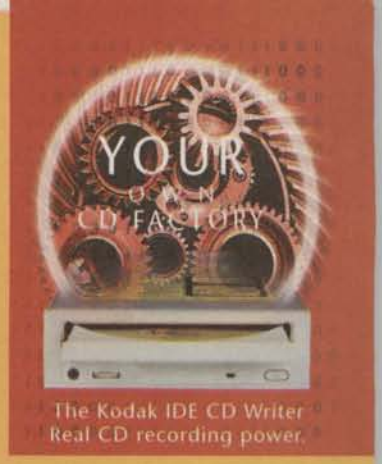
Dealing with huge rivals such as IBM and Microsoft doesn't faze her either. Dragon has licensed technology to Microsoft, and before IBM could release its own voice dictation products, it licensed Dragon technology. IBM now has the other leading voice recognition package, ViaVoice, but even the fact that Big Blue has the opportunity to integrate its speech recognition with its other products isn't necessarily a problem for the Bakers.

"Look at it this way — we license to all their competitors. It's good to test your mettle that way. And I think good competition makes for good products and good markets, and better satisfaction among customers. It's a lot of fun besides."

There are plenty of others in the IT industry with new ideas and an interest in a particular subject, but few dare to pursue it. Janet Baker's advice for those who want to build a company around innovation is to "follow your passions".

"Do what's important to you. You can overcome things like lack of money. There are a lot of excuses for why you can't do things. But if you're really committed to doing something and have your wits about you and are willing to work hard, there's no reason why you can't accomplish it. I mean there are lots of things you don't have — you find other ways of doing them if you're resourceful and it's surprising how many you can make work if you're committed to it."

For a full transcript of the interview with Janet Baker, see http://apcmag.com/profiles/9910baker/.



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FEATURE

A SURE BET?

Gambling on the Internet has taken off and is expanding rapidly worldwide. Australia is well positioned to become a world leader in the industry, at a time when countries such as the US are moving to ban online gambling. Analysts predict that electronic betting will be a boon for government revenue and a bonanza for gambling providers, but what will the impact be on a nation of gamblers? **Selina Mitchell** investigates.

Like it or not, Australians love to gamble. Last year, more than 80% of us gambled (excluding raffles and sweeps), and the amount that we spend on gambling is rising. Spending has doubled compared to a decade ago and is now three times more per capita than any other country.

New technologies and computerisation have had a role in increasing access to betting facilities, according to director of the Australian Institute for Gambling Research Professor Jan McMillan. In the late 1980s and early 1990s, technology that enabled strict auditing and control led to the proliferation of electronic gaming machines and pokies.

In the digital age, gambling options have been further enhanced. It has never been easier to take a punt. Anyone with a PC, modem and Internet access can enter a virtual casino or sports betting agency, if they pass the authentication and account registration process. To find a gambling site a punter simply has to use a search engine or enter a known address in the Web browser.

Internet gambling sites have existed since 1995, but the industry has only really boomed as a result of recent advances in Internet speeds, security and graphics. The world's first government licensed and regulated casino is based in the Northern Territory and it is taking bets from around the globe, all at the click of a mouse button. Soon a number of private and spectatorless race tracks may be set up in regional South Australia to take bets from an Internet-only audience.

Professor Paula Swatman, director of the RMIT's Interactive Information Institute said that sites and technology are developing quickly. Online gambling is currently only a small part of Australia's $11 billion gambling industry; only around 86,000 Australians, or 0.6% of the population, gambled on the Net in 1998/99. But online gambling is beginning to grow rapidly.

This July was a record month for online wagering and gaming company, eBet. Turnover in the year to July 1999 reached $1.17 million on its racing and sports betting Internet site, which was 10 times higher than that achieved in the previous corresponding year (see 'Betting on the punters', page 78). Another provider, Canbet, has seen takings rise to more than $3 million in July this year, up from $1 million in July 1998 before it offered Internet betting. Yet another sports betting company, SportOdds, has generated 40% of its revenue via its online gaming presence in its first five months of operation.

According to the Productivity Commission draft report *Australia's Gambling Industries*, there are 150 sites worldwide offering two types of gaming services: virtual online gambling, which involves software-generated games, and betting on an event, such as a horse race or cricket match. The majority of providers are small companies that are licensed in their own countries but largely unregulated. Most are based in the Caribbean; less than 10 are located, licensed and regulated in Australia.

The report notes that online gambling offers significant potential benefits to some consumers, including greater choice, and scope for commercial returns. However, it adds that without palliative

measures and regulation it will pose significant new risks for problem gamblers. Because online gambling provides a "quantum leap" in accessibility, it will generate an entirely new group of gamblers, according to the report. Regardless of the course of action governments take to liberalise, control or prohibit gambling, there are strong grounds for palliative measures. Warning people about the hazards of offshore gambling, providing online information about gambling help services and user-based blocking software are all recommended.

The Senate Select Committee on Information Technology (SSCIT), which also investigated online porn, received more than 50 submissions regarding the investigation of online gambling in Australia. The committee has been asked to examine the nature, extent and impact of online gambling, the feasibility of access control, the adequacy of state and territory legislation, and the need for Federal legislation. Hearings are expected to begin in October and should be completed by early next year.

A piece of the action

Worldwide expenditure on Internet gambling reached $US651 million in 1998 and jumped to $US1.485 billion in 1999, according to US analyst Sebastian Sinclair, from Christiansen, Cummings and Associates. He predicts that figure will rise to approximately $US3 billion in 2002.

Australia may have an important part to play in this rise. A recent study by research company Merrill Lynch suggests that Australia could be a major player in the online gambling industry due to the introduction of regulations in some states and the expected ban on Net gambling in the US.

As a result, developers in other countries will begin to turn to Australia when looking for a reputable country to work with in building solutions. Already, US companies are beginning to flock to Australia in search of government licences. According to Las Vegas gaming attorney Anthony Cabot, this trend is a result of the slow passage of Internet regulation through Congress (see 'Banning the bet', page 84). US analysts predict that these overseas companies will also eventually include large players such as Las Vegas casino operators.

Cabot warns that Australian Internet gambling companies may soon face a campaign of 'dirty tricks' from unlicensed overseas operators. Some operators will try to fool gamblers into thinking they are endorsed by Australian authorities. He even claims that some operators might steal ideas or logos, or illegally copy Internet gambling licences.

A representative from Centrebet, an Australian licensed and regulated online sports betting operation, notes that competition is already fierce.

Overseas gaming providers may be keen to obtain licences to operate here, but so are Australia's established casino operators. Jupiters, based on the Gold Coast, Sydney's Star City and Tattersalls, believe that Internet gaming is the way of the future, and they want to become involved. Piers Morgan, general manager of gaming and waging development at Jupiters said the casino operator had

A sporting chance

In the last seven years Centrebet has become one of the largest sports and race betting providers in the southern hemisphere. It is also one of the world's leading Internet gambling operators. It has a turnover of about $3 million a week, one-third of which comes from overseas. Launched in 1996, the Web site now represents 30% of Centrebet's business activity and handles 10,000 bets a week. All of this has occurred without any direct expenditure on advertising, said sports betting manager Gerard Daffy.

"We really don't know how big the global market is or how big it would become if we advertised," he said. So it doesn't.

Centrebet attracts customers by word of mouth, the supply of reliable and constant services, its role as a wagering representative in the media and its large range of betting options, according to Daffy. Punters can bet on a diverse range of codes and events — including soccer, the rugby codes and basketball — around the globe. Bets are taken by phone, over the counter and online.

Centrebet accepts wagers from people around Australia, although most clients are based offshore. Its multilingual site does not include the usual language groups; it features Swedish, Finnish, Danish and Norwegian instead. Twenty percent of Centrebet customers are from Scandinavia, 20% from the US and another 20% from Australia. The best customers are probably those from countries where income and Internet use is high, and where sports coverage and betting is common, said Daffy.

Centrebet's overseas trade is aided by Australia's standing as a reputable and regulated gambling environment. "We are seen in a good light overseas and our stable economy helps."

Daffy said that the online service is the way of the future. "It is cost-effective for both sides." Punters get tax-free betting and the provider has reduced overheads.

The success of online sports betting has enticed others to consider entering the market. The Northern Territory Government has granted licences to three sports betting operators, two of which are already online. A number of overseas organisations are now also seeking licences, but Daffy believes the market has already reached saturation.

Gaining a licence from the government is not an easy process. Daffy described the probity checks as unreal, but acknowledged that this is appropriate, considering the nature of the business and the money involved.

Selina Mitchell

already dipped its toe into the Internet waters with its acquisition of online sports better Centrebet and was planning further moves.

"Internet gambling is inevitable — it is here already," said Star City spokesperson Peter Grimshaw. He said that Star City is considering its online options, but noted that there is no interactive gaming legislation in its home state of NSW as yet. Grimshaw believes the Internet will extend Star City's market, rather than erode it. "Nothing quite beats playing in a casino. True players will still come into the casino."

Tattersalls is investigating a number of interactive opportunities and is seeking licences in both Tasmania and the ACT, according to spokesperson Lance Behan.

Cause for concern

Many Australians may believe gambling is an acceptable and entertaining pastime, but there are other issues to consider.

The commercial benefits and export potential of Internet gaming are noted in the Productivity Commission report. It points to the increased opportunities for recreational gamblers and the potential for reduced operational costs, as well as improved access for those who have problems with mobility.

However, the Productivity Commission also acknowledges community concern about the effects of online gambling. The majority of respondents in a Productivity Commission survey said they believe gambling does more harm than good; 92% don't want to see an increase in gaming machines.

The Productivity Commission report outlines a number of concerns about online gambling, including the significant risk of increased problem gambling if harm minimisation procedures and regulations are not in place. The potential for minors to access online gambling is also identified as a concern. The commission suggests that children would be discouraged from gambling online because they can't access winnings, they need a password to access the supplier, and parents could easily detect their activities by checking credit card statements. It does, however, agree that some minors will have their parents' consent to gamble, and others will be technically astute enough to get through authorisation processes.

Another potential problem is supplier integrity. How do players ensure that games are fair and that security and privacy standards are met? Some overseas operators have been found to have criminal histories and there have been allegations of copyright infringement, cheating and fraud, according to Cabot.

Consumers are likely to be cautious, initially betting only small amounts, the report suggests. Small changes in player returns that lead to large increases in actual prices are hard to detect. It is also difficult to determine if a lottery is legitimate; the probability is you won't win over a lifetime. To combat these problems, the report recommends an appropriate regulatory framework and monitoring, as well as codes of practice and dispute resolution procedures.

Providers don't deny there are downsides and risks associated with gambling. They do suggest, however, that regulated Internet gambling sites are inherently safer than other licensed venues. Global

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Gaming Services managing director Steve Toneguzzo believes the principles applied to physical casinos could be applied more rigorously to Internet gambling.

A number of consumer protection items can be incorporated more easily with the help of technology, according to analysts. A record of every wager made online is archived, so theoretically it is possible to track a player's activities. Technology can also allow the player to set limits in terms of the amount of wagers and frequency of play. In a casino players can always change their minds, but the technology used on regulated sites won't allow you to do that.

Keeping them clean

Any company that wants an online gaming licence in Australia must pass a number of stringent and expensive tests regarding the way it proposes to conduct its business. Gaming sites each spend about $100,000 on independent assessment to ensure their gaming systems meet requirements before receiving a licence. The IT auditing and evaluation process takes months, but helps maintain Australia's reputation as the most regulated, and therefore 'cleanest', country in the world for gambling, according to auditors.

Toneguzzo said that if governments choose to regulate online gambling, there are options for tight control and the inclusion of new technologies can aid the process. "Government can offer consumer choice and trust. They can say, 'Here is our regulatory regime. Yes, it is tough, but it gives players a global market and assurance that it is fair, and that has to be worth money to you'," he said. "It is about finding a balance between maximum profit and social considerations."

The regulatory regime each jurisdiction sets needs to be transferred to technological requirements. Once systems are designed and built to those standards they must be tested and certified before they can be used. After installation by a licensed operator, constant checks of operations are required. (The checking procedures also need to be tested for compliance before they are used.)

"It is a long, drawn-out process," said Technical Systems Testing general manager Peter Day. Everything from how the storage and distribution of winnings occurs to the security of the physical site is assessed. "Traditionally in gaming each machine has its own RNG [random number generator] that determines if and what each play wins. Internet gaming uses client/server technology and the RNG works for everyone. We need to ensure that the number being generated is unique for each player," he said.

Auditors check the reliability of hardware, operating systems and gaming software. They examine the backup and data recovery systems, reporting capabilities and monitoring options. Event logs are essential, for example, as is virus protection software, a facility to replay the last game, and proper authentication processes. They also ensure that all the games are conducted fairly and that player returns are calculated accurately.

In addition to the estimated $100,000 testing costs, there are ongoing costs associated with the testing of each new game when it is released. The aim is to ensure that each game is fair, secure and auditable.

Lasseters Online executive manager David Ohlson believes the regulations that cover its online operations are much tighter than those that apply to casinos. He said that in a casino the identity of all players cannot be verified, nor can their spending be restricted or reports provided on their playing history.

Lasseters' players are initially restricted to a maximum deposit of $500 a month in their playing account. They can only wager with this deposit and any winnings they may accumulate. The minimum wager online can be as little as 1 cent. The registration process restricts access only to those over the age of 18 who have adequate funds. There are also links to counselling services for those who believe they have a gambling problem (as well as a self-exclude button), and to content blocking software. Without regulation, such controls would not be enforced across all sites, Ohlson explains.

Prohibition or regulation?

Regulation is often suggested as the solution to the potential problems associated with online gaming. However, having a poker machine in the house does not appeal to everyone, and some are calling for the prohibition of online gambling. The Festival of Light, the Interchurch Gambling Taskforce (ICGT) and a member of the South Australian Legislative Council, Nicholas Xenophon, from the No Pokies Party, are among those lobbying for prohibition.

Xenophon draws attention to the very high social and economic costs associated with gambling outlined in the Productivity Commission report. It suggests 2.3% of adult Australians (330,000 people) have significant gambling problems and their spending represents one-third of all money spent on games of chance.

According to Xenophon, access to gambling has already reached saturation point, and new forms of gambling will increase the problems. "We already have the highest number of gambling losses in the world. A tidal wave of problem gambling could result. There is a real potential for harm," he said.

Xenophon is also concerned that spending on gambling might divert revenue that could be spent on other online products. He said once online gaming is given the sanction of the state, people will believe it is safe to use any site. While there may be commercial interests for allowing online gambling, Xenophon believes there are more practical reasons for banning it. If Australia becomes a Mecca for gamblers, he believes, "we would become a pariah for a number of nations".

"At least we should make an attempt to stop it," said Xenophon. "I am not trying to deny free speech, just trying to nip in the bud [increased] gambling operations."

"This is a graphic illustration of the tensions between practical and principle," said McMillan. "There are people

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Betting on the punters

Is there money to be made in becoming a supersite for Internet gaming? Representatives from eBet Online think so.

The electronic agent is not a bookie; eBet facilitates the gaming process for licensed agencies, providing access to its betting interface from multiple Web sites, including its own. So far it has developed NZ TAB's online betting service, allowing punters to turn their PC into their own betting agency with live odds and track conditions as well as betting options. Punters can access the betting interface from eBet or a number of NZ TAB Web sites.

eBet Online will also soon provide gamblers with access to Tattersalls games, including Tattslotto, Oz Lotto and Powerball. However, according to product manager for racing and sports Ben Astill, the options will not end there. eBet is currently negotiating with new clients from the US, UK and Asia to provide them with a similar facilitating (or portal) service. He also hopes Australian TABs will come onboard — even those that have already set up operations internally. There are both complementary and competitive aspects to the eBet model.

eBet has a growing base of dedicated online punters (numbers have quadrupled in the past year). The punter's ability to compare prices for events and bet with rival organisations means that providers need to ensure their competitiveness. Astill believes this could increase the number of overall punters involved in the industry and expose providers to a global market. He added that people are more inclined to place bets if they have more information readily available.

There is currently only one sports and race provider on offer, and things are going well for eBet and its client. In the financial year 1998/99, NZ TAB turnover increased by 70%. The online turnover is now four times that of the largest NZ retail outlet.

eBet management wants its site to become a gaming and wagering portal for *reputable* organisations. According to Astill, there is a big difference between licensed, regulated operators and those that have paid a government to operate in the Caribbean.

eBet will concentrate on licensed companies with a history in the gaming market. "No-one has had a problem receiving a payout from Tattersalls or the NZ TAB."

Although the US is more conservative about Internet gambling, eBet relies on a group of US-based software developers to help run its business. eBet's software has its origins in the US. Astill said, "What happens behind the screen is incredibly complex. The US is 12 to 18 months ahead of us in terms of technology developments. We need the best so we tap the bigger pool of talent in engineering available in the US."

Selina Mitchell

who strongly believe that Internet gambling should be prohibited. However, most technical experts say that you can't really do this. You can have legislation prohibiting interactive gambling, but you need to back it up, and it is very expensive to do this. Is government prepared to spend the billions necessary, and watch Australian money go to offshore gambling sites? That's what will happen. Australians will use the services no matter who supplies them."

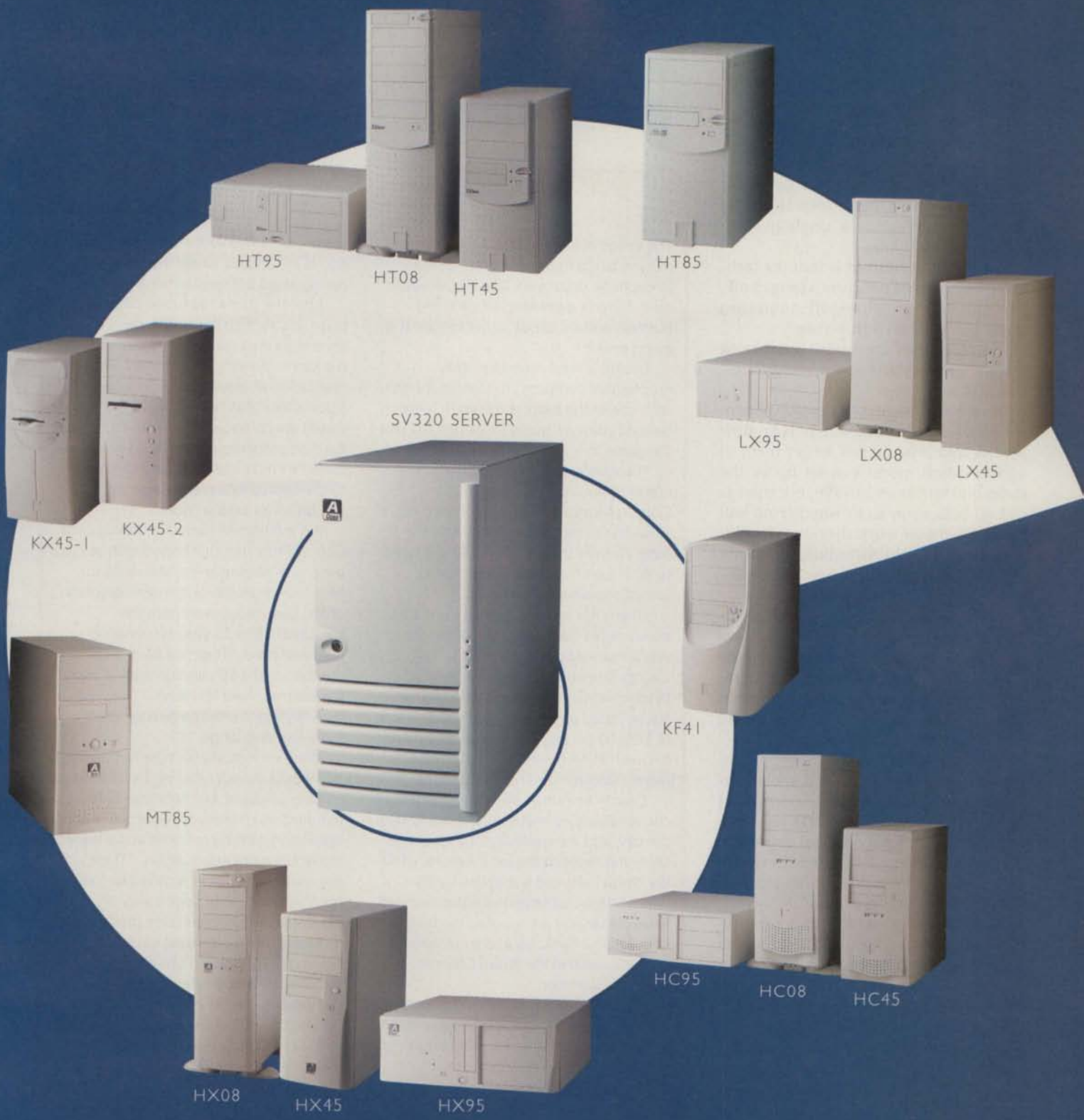
Swatman said the US experience illustrates this point. "They have not stopped people gambling online, they have just forced them to do it on sites based in the Bahamas. It is naive to think that everything is perfect in the Australian environment. However, we are moving in more or less the right direction."

The Productivity Commission report notes that there are a number of relatively strong arguments for prohibition, citing new risks for problem gamblers as an example. It is hard to slowly increase access, which depends on the number of PCs with Internet access, not the number of Web sites. However, it suggests a regulatory approach be taken. "Prohibition of online gambling would reduce gambling problems associated with the Internet, but would also eliminate any benefits of the technology. Managed liberalisation — with tight regulation of licensed sites to ensure integrity and consumer protection — has the potential to meet most concerns, so long as the approach is national."

The report noted that there are significant advantages in taking a national approach to Internet and interactive gaming, both to preserve tax revenues from the risk of tax competition and to ensure that standards of consumer protection are uniformly high and coordinated. It would be better to have one national site with information, self-diagnosis and referral for problem gaming linked to each online provider. It would also be preferable to have one database for consumers to exclude themselves from any or all providers, a national system to block access to illegal sites and to police infringements, and one system for tax setting and collection.

Reaching agreement on a national approach for Net gambling has proved difficult. According to ACT manager of taxation services Des McKee, state ministers have had little success coordinating policy on Internet sports betting in Australia. McKee said that he supports cooperation between states, but doubts there will be a collaborative approach. "[State officials] used to meet annually, that's about the best they could do. The last one was bypassed," he said.

Many of the people *APC* spoke to believe it is time for the Federal Government to step in. "Now with digital technology the control of gambling has been removed from any single government. We



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are talking about cross-border gambling of a type we have never seen before. It can't be controlled by a single government," said McMillan.

"My greatest concern is that the technology is ahead of policy by a long chalk. You can't get a [physical] gambling venue like you can a chip shop."

"Governments are under pressure to act quickly to legalise sites and regulate," said McKee.

State governments can develop memoranda of agreement, but it is a slow process and it is difficult to get them to agree. A draft model was set up by the states and territories in 1996, but there is still no indication as to whether all will follow the model when they draft legislation. According to McMillan, there are already some inconsistencies in the legislation that has already been passed.

"Technology is global, but our political system is based on jurisdictions. If we can't get a national agreement at state level, we need cooperation with the Commonwealth and states to work to get a national and international policy and standards," said McMillan.

However, there is a constitutional barrier to federal involvement. A spokesperson for the Federal Attorney-General said that while he understands the concerns, and the reasons for a national approach, the reality is that under the federal system the Commonwealth doesn't have constitutional power over gambling.

Many disagree, stating that constitutional powers have been used in the past to decide matters traditionally in the realm of the states. "Those that say this is solely an issue for the states should get their heads out of the quicksand," said Xenophon. "It is an abdication of responsibility given the enormous power it has in banking, [external affairs] and telecommunications under the Constitution."

However, for the states and territories, it is not only a question of how to control the borderless Internet in their jurisdictions, but also one of how you collect revenue. Tax collection lies at the heart of the issue. "The difficulty with agreements on Net gambling is based on [each player] wanting to create revenue for their own coffers," said McMillan.

Gambling industries are subject to a number of state and territory taxes, licence fees and levies. As revenue from gambling has increased, so too has the revenue from its taxation. Gambling taxes now provide nearly 12% of state-tax revenue.

"We might see a tax war to attract betters," said McKee. States that have regulated Internet gambling have different tax rates. While the tax rate in the Northern Territory is 8%, it has been set at 50% in Queensland, and 50% has been suggested in Victoria. A 4% rate is planned for Norfolk Island. Grimshaw said that tax rates will be a big factor in each company's decision on where to set up its online operations. He noted that 50% seemed a little high.

There is a history of a reduction of tax rates to attract industry, but low tax rates benefit the operator at the expense of the government and taxpayers, according to McMillan. "Companies don't need a large capital investment to get into this industry, and the profit margins are likely to be enormous. Government can ask for big taxes to cover the social costs. If we are going to do this we need to make sure it is of community benefit — there will always be social costs that need to be recouped."

State by state

The ACT, Tasmania, Queensland and Northern Territory have all passed

Legs eleven

The image of lovable Miss Marple-types playing bingo in a community centre is about to be destroyed. Like almost every other form of gambling, bingo is big business and it's about to get bigger. It's going online.

Emaris, a West Australian Web enablement company, has joined forces with one of the biggest names in bingo halls, UK-based County Properties, to take the game to an international audience.

"Language isn't international, numbers are," said Emaris director Gordon McIntosh. "You don't need to speak the same language, or be in the same country to play bingo. All you need to do is match numbers, and that's something anyone can do."

Emaris has supplied the back end that makes online bingo possible. Along the way it has snagged a neat deal with County Properties that will see 50% of bingo revenue routed to its coffers. That figure, based on an estimated monthly loss of $US100 per player, could be anywhere between $US4 million and $US6 million a month, according to McIntosh.

County Properties brings the gamers, conservatively estimated at around 52,000 per day, and the credibility of a reputable UK brand name to the joint venture, while the bingo front end is supplied by US-based Atlantic International Entertainment. Financial services are supplied by the blue chip Barclays Bank, via a series of Web servers located in the British Channel Island of Guernsey.

The actual gameplay doesn't happen in Australia or the UK, but in the Pacific island of Vanuatu. "Australian banking regulations don't permit banks to accept credit cards for gaming," says McIntosh. "For that reason, all the resolution of all the wagers occurs in Vanuatu, where the joint venture has obtained a 20-year gaming licence."

After the game resolution has taken place in Vanuatu, the results are communicated via 128-bit encryption to the servers running in Guernsey, where finalisation of credits and debits takes place. Once that has occurred, the final results are communicated with the Barclays mainframe via an X.25 link, and the final credit and debits are then made to the appropriate credit cards via Barclay's Visa card service.

It is established names like Barclays and County Properties that bring legitimacy to the online gaming arena, according to McIntosh, especially as the demographics of Net users move away from the traditional 18 to 35-year-old university-educated male. "There are far greater numbers of the 50-plus age bracket using the Internet," said McIntosh. "This perfectly aligns with the demographics of those that play bingo."

Western Australia isn't the first place one would consider looking for Internet gaming solutions, but McIntosh believes that Australia is globally respected as a supplier of gaming solutions and a leader in friendly gaming legislation. "There's not enough money in Australia for R&D, but there is a strong community of developers working on these products," he said. "The government is, I think, pragmatic enough to realise that everyone stands to benefit if a [legislative] compromise can be reached."

The Emaris/County Properties bingo venture is expected to launch towards the end of September.

Josh Gliddon

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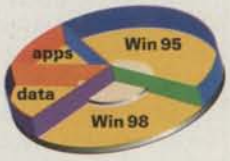

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The struggle to be first

When Lasseters Online began operating in April, it had the privilege and marketing advantage of becoming Australia's first virtual casino and the world's first government-regulated and licensed operation. However, being first has taken a great deal of time and energy.

Lasseters Hotel Casino has been in operation in the Northern Territory for almost 20 years. The management team was keen to extend services online, explained executive manager David Ohlson (pictured), but there was no regulatory framework in any of the states. Lasseters approached the Northern Territory government and three years later the company was given a licence.

Nobody knew much about what was required at the time. "The government grew with us. As their knowledge grew, more conditions were placed on us. It was a slow process on both sides. Everyone wanted to be cautious," Ohlson said. Another problem was that there were no products available to power the site, either here or overseas. It took $5 million and two years to develop the graphics, software and security systems required to provide the software-generated games and infrastructure.

Being first does have its advantages. "There are 30,000 people living here in Alice Springs. On the Internet we have a market of 137 million!" One of the smallest casinos in Australia can become one of the largest with minimal staff and no gaming table or accommodation costs.

Lasseters has taken $6 million in bets from players in 118 countries after just five months in operation. "We have a growth rate of nearly 100% a month," Ohlson said. This isn't expected to taper off in the medium term, and he predicts it will be a $100 million market in the next two years.

Initial fixed costs were high, but the expensive part of the operation is now marketing. Development costs are also high. Lasseters is already spending $3 million on new games, software and network equipment for the site.

Travel costs also need to be considered. Lasseters Online may be based in Alice Springs, but much of the planning and development of its product is done outside of the Northern Territory. "We are licensed in Alice Springs, but we can't get the games, software or hardware there — that is all on the east coast."

There are still some regulatory issues that have not been resolved. Ohlson would like Lasseters to be able to take bets across Australia, but this can only happen once there is a national approach to Internet gambling. Until then, Ohlson believes there is no point in wasting revenue. Online gambling is available to international players and residents within the physical casino's licensed territory, the Northern Territory, and there are offshore sites taking and profiting from Australian bets now.

The licensing agreement with the Northern Territory government provides Lasseters with exclusivity for 12 months, then it will be open slather. "We believe we will have a lot of competitors. Eight percent is a very attractive tax rate. But they will all have to learn from us. There is a steep learning curve. You don't just turn on the computers and get people coming to you to place bets."

Selina Mitchell

legislation allowing for interactive gambling under differing conditions. NSW has allocated licences for online sports betting, but is yet to draft legislation for online gaming. A spokesperson said the government is still considering whether it will do so. The Victorian Parliament passed its interactive gaming legislation earlier this year, but it is not yet in force.

No legislation has been drafted in Western Australia, and there are no plans at this stage to develop any, according to a government spokesperson. South Australia, which has a very strong anti-gambling community, has a parliamentary select committee examining the issue at present. A Treasury official said that it intends to pass legislation in the future.

In April this year, the Northern Territory government granted Australia's first online casino licence to Lasseters Online. It has a 12-month exclusivity agreement, but competitors are already making plans. Queensland licensed its first online betting company, Gocorp, in June, and a number of others have applied. At the time of writing it was uncertain whether Gocorp would begin operations. Even before it was licensed it was embroiled in a political scandal. Three state Labor Party identities were found to be minority shareholders in the company. At the time of writing the government had passed retrospective legislation to strip Gocorp of its licence within 30 days if it didn't sever ties with companies linked to the Labor identities.

Norfolk Island is also attempting to gather revenue from licensing online casinos. Although questions have been raised about the island's telecommunications infrastructure, it will be offering very low tax rates. Its government has already passed legislation and is examining a number of applications.

Online casinos licensed on the island will not be able to take bets from mainland Australia. Norfolk Island Gaming Authority director of gaming Kev Leyshon said that the community wants to maintain a good relationship with mainland Australia, and doesn't want to usurp revenue from other states.

It is the international implications of Internet gambling that most concern many analysts, however. Australian state and territory legislation that attempts to control online activities outside of its jurisdiction is not likely to have any impact. Governments can assert their jurisdiction wherever they like, but whether they can successfully prosecute offenders based offshore is another matter completely. Some governments outside of Australia have made it, or are attempting to make it, an offence to bet online. What this means for providers in other countries is hotly debated.

McMillan sees this as a perfect example of why we need federal government input. "What if we accept bets from the US? This is why federal government needs to be involved. There are going to be intergovernmental disputes and it is better to establish international agreements than to react when problems occur."

There are extradition treaties that apply in some circumstances, but these require dual criminality — you have to offend against the laws of both countries. An Australian can't be extradited to a foreign country if it is not a crime here

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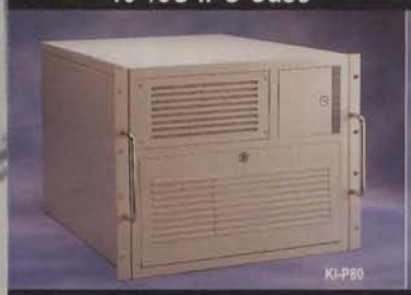

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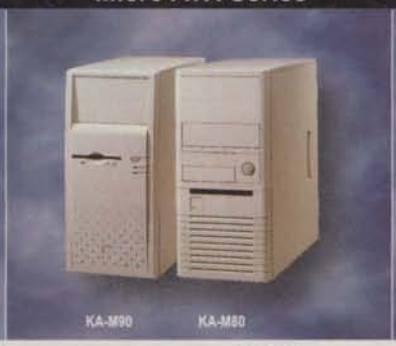

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Banning the bet

In the 'land of the free' there are questions about access to online gambling. A combination of state and federal legislation ensures most gambling is illegal in the US. A few states have passed legislation to allow physical gambling sites (Las Vegas and Los Angeles are two well-known gambling centres), but even these states are not able to launch online gambling sites.

There are attempts to ban Internet gambling at both the state and federal level, although no Net-specific legislation exists. The 1961 Federal Wire Communications Bill, which prohibits the use of telephone lines for betting or wagering, is probably the law most applicable to Internet gambling. However, Congress is working on more up-to-date legislation to clear up new technology and jurisdictional issues. As in Australia, individual states have direct control over gambling, but in the US states recognise that they are unable to control online gaming.

In 1998 Senator Jon Kyl introduced the Internet Gambling Prohibition Bill. It was easily passed through the Senate, but didn't make it through the House before Congress adjourned. The bill was reintroduced earlier this year. If passed it will be illegal for a person engaged in a gambling business knowingly to use the Net or any other interactive computer service to place, receive or otherwise make a bet or wager, and to send, receive or invite information that would assist in the betting process. Fines of up to $US20,000 and/or four years imprisonment apply.

The earlier version of the bill would have also found players liable, but this has been dropped. In the new bill, ISPs must not provide access and must take reasonable steps to block access to an identified foreign location or to domestic subscribers. If Kyl's bill is passed most types of wagering over the Internet would be prohibited, according to Cabot. In order to gain political support and ensure it passes, the bill exempts horse and dog racing, state lotteries and fantasy sports leagues.

The reintroduction of the bill follows a US government-commissioned inquiry into online gaming recommending prohibition. The National Gambling Impact Study Commission spent two years examining the impact of Internet gambling. It wants the US state governments to prohibit online gambling "not already authorised within the US or among parties in the US and any foreign jurisdiction". It suggests that Internet service providers, credit card providers, money transfer agencies, makers of wireless communications systems, and others who intentionally or unintentionally facilitate Internet gambling transactions should be subject to enforcement strategies. Wire transfers to known Internet gambling sites or the banks which represent them should be prohibited and legislation should be passed stating that any credit card debts incurred while gambling are unrecoverable.

The impact this will have on Australian service providers is unclear. It appears it all depends on your interpretation of the law. Some Australian operators, such as eBet, do not take bets from US citizens, while others, such as Lasseters, do.

"We take the view that we can't afford to be a test case. We are in this for the long haul and our interpretation of the law says it's not possible," said eBet's Astill. "It depends on your interpretation."

US citizens visiting physical casinos in Australia cannot be prosecuted, most agreed. Lasseters Online executive manager David Ohlson said that Lasseters extends this aspect of the law to include its Australian-based and regulated virtual site.

Selina Mitchell

also. An Australian ISP may be theoretically liable under US law, even though it is not breaching Australian law. Would representatives from such an ISP set foot on US soil?

Other regulatory questions remain unanswered. Gambling has social costs and online gaming has a global reach. Should Australian governments be concerned about creating a globe of gamblers? Another consideration is the delineation between games and gambling. "If you pay a fee to play chess, and if there is a process of reward for winning, it could be regarded as soft gambling. Microsoft offers multiplayer games and tokens or rewards for winning. Is that gambling?" asked Swatman.

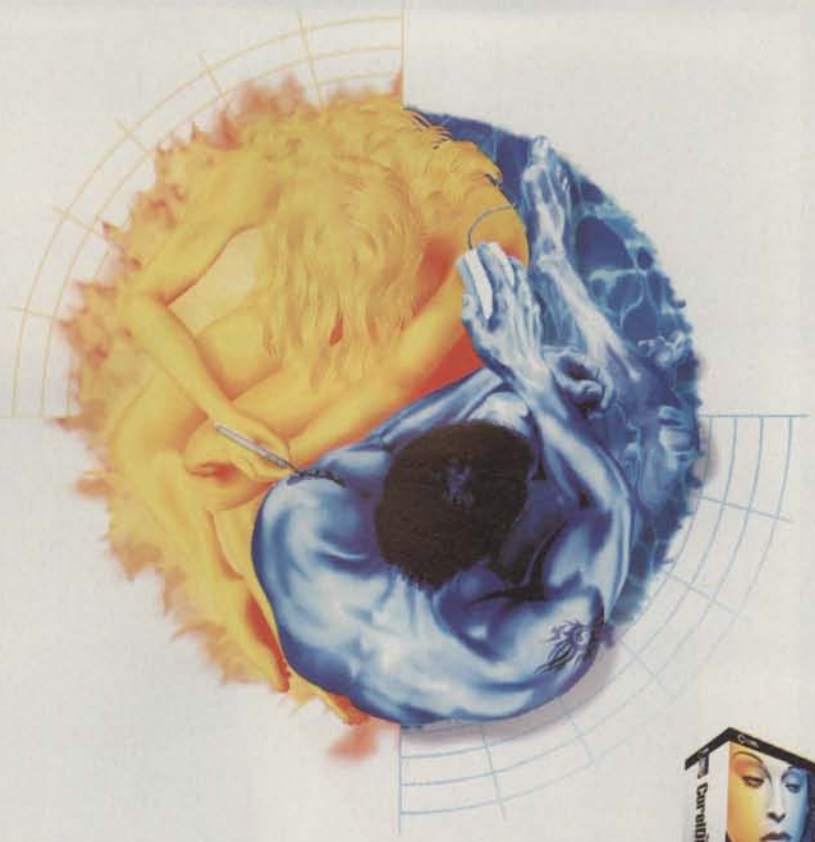
What odds for the future?

The Internet is in its infancy and subject to rapid change. We can only guess what is to come. "One likely feature is an increase in the pace of gambling as more gambling modes become continuous. Future developments are likely to see instant keno and continuous lotteries available on the Internet," suggests the Productivity Commission report. There is also likely to be an expansion in the types of products delivered beyond the more traditional casino-style games and pokies to perhaps include network adventure games such as Doom, according to Toneguzzo.

New technologies could generate more safeguards to reduce the social harm of gambling, but it creates new risks. "The new technologies may create more manipulative environments for gamblers," states the report. "It is possible that virtual intelligence will be used to manipulate the behaviour of the individual gambler in ways that are far more subtle than existing gaming machines . . . Through electronic trails, the new technologies are able to collect more information about participants than was previously possible in the gambling industry. A computer, for example, could record the type of play (and if the person has used a membership card, look closely at the history of the play) and interact with the player accordingly."

Internet gambling is only one form of interactive gaming. The Internet is still

The Art of Balance



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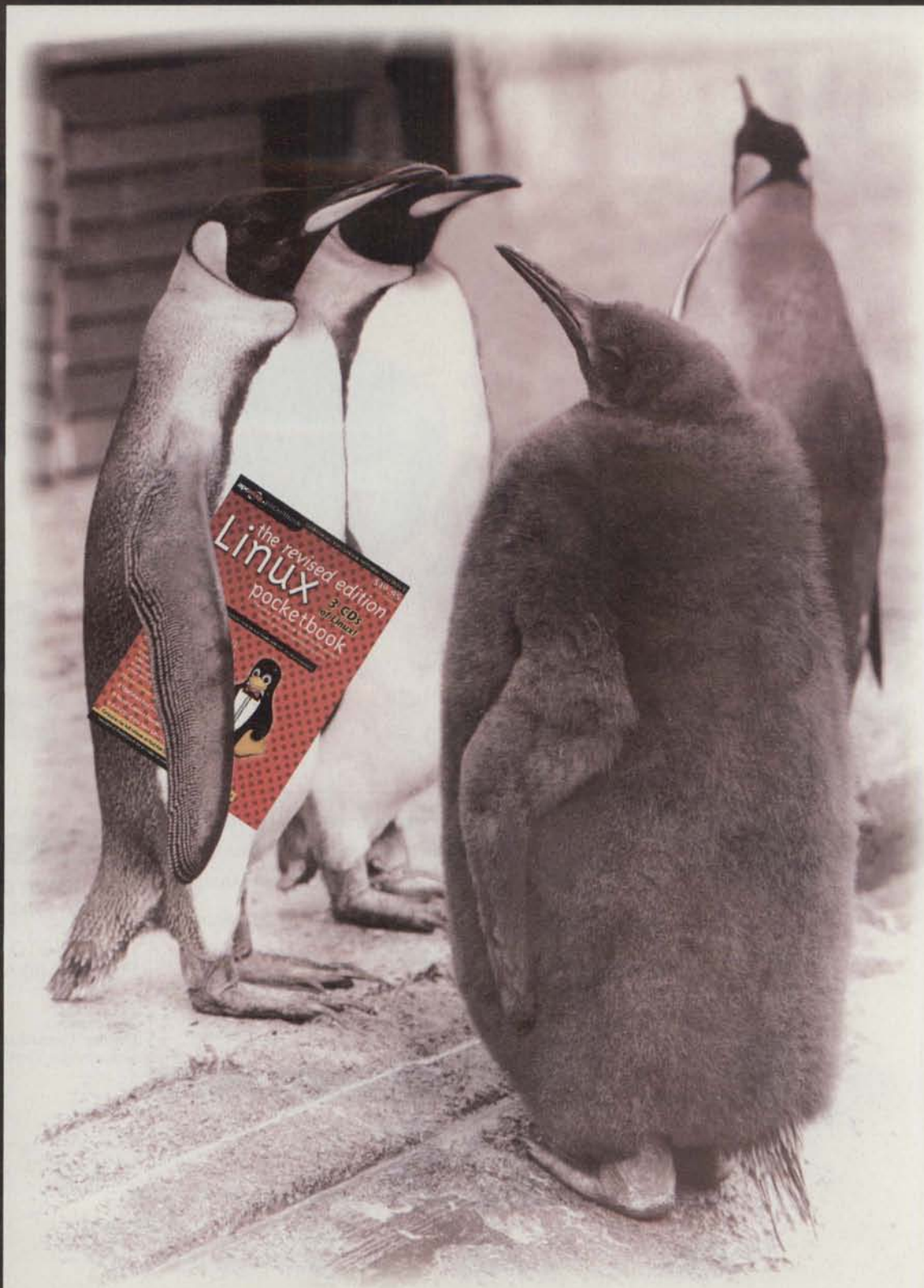

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constricted by its download times and relatively small market segment at this stage. "Digital TV is just around the corner and that will really help [interactive gaming] take off," McMillan said. "And then we won't bet on results, we will bet on interactive events. Will Greg Norman sink his next putt or not? Will Sampras ace Rafter on this next serve? And we will be doing it from our lounge rooms, and so will people in Asia and Europe and the Americas."

At the moment, however, accessibility is an issue. There are fears about the technology, security and privacy. Consumers are likely to be wary of Internet gaming for some time, until they are sure it works, and pays, well enough.

Internet gambling must solve the same issues facing many ecommerce projects — the provision of adequate systems for funds transfer and high bandwidth, as well as high security for the transactions. "We see Internet gaming as the leading edge of ecommerce. Gambling is pure ecommerce. The only product exchanged is money. By solving problems with gaming we are solving problems that will be faced by all of those conducting ecommerce projects," said Toneguzzo.

However, there are also many social issues that need to be addressed, according to Swatman. "It is very difficult to separate the social, technical and economic issues with gambling because they are intermingled."

McMillan said that we need to get the regulation and the social policy right. "It is very difficult. These are unchartered waters, but we need to take a public interest perspective. I am pleased that the debate is coming along, but the community voice is missing."

Meanwhile, Australian developers are busy building products to meet strict guidelines for countries where they exist. "The US has all but banned online gaming — it is up to us to be a world leader in this area," said RMIT senior lecturer Mark Gregory, who is building a Net gambling product. He has been working on the project for four years and expects the system to be licensed and online by the end of the year.

"Everything has to be done to make sure sites are run by reputable people in a responsible way. I am not a gambler; I am just an engineer. I try to build these systems as well as I can within requirements. Hopefully I am helping governments address the social issues by providing good, reliable systems they can benchmark from. If they change the legislation we will change the product."

Additional reporting by William Maher

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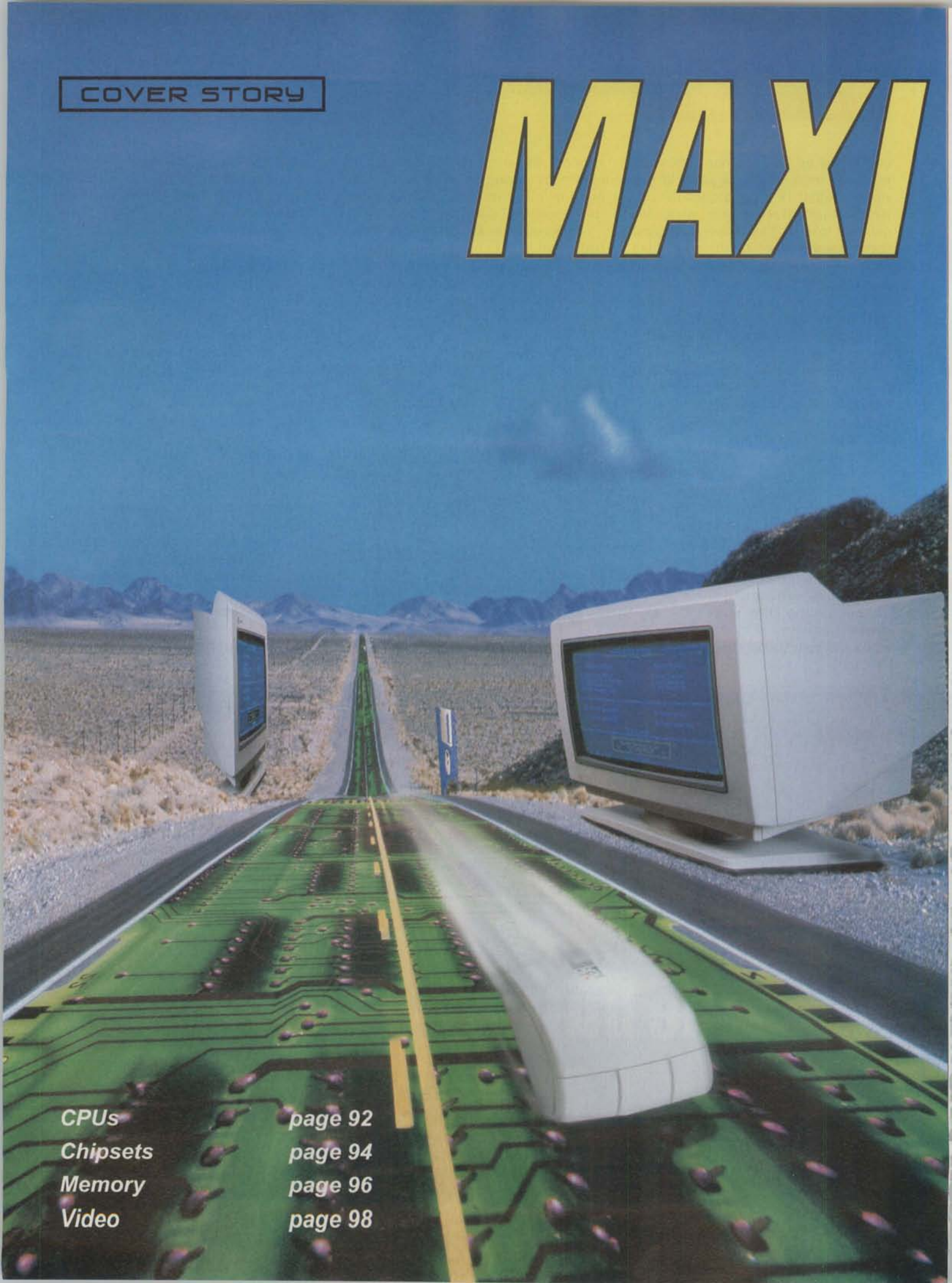

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MUM SPEED

Ever wondered how much extra power you really gain by upgrading your processor? Trying to decide whether a new graphics card is worth the money? Think it's time for a memory upgrade? Then wonder no more. *APC* Labs tested the components that can enhance your computer's performance. **By Darren Ellis, Josh Mehlman and Nathan Taylor**

There was a time when the only noteworthy feature of a PC was its CPU speed. There are now so many factors that contribute to a PC's performance that it is a lot more difficult to determine which combination of components is the fastest. You need to consider memory size, the video card, the hard disk and hard disk interface, the soundcard, chipset, and of course, the CPU.

We reviewed some of the current options available to give your PC more grunt. This is not just a guide for upgrading. It's also for new computer buyers who want to get the most byte for their buck. So, if you can't decide whether you should buy an extra 64M of memory or upgrade the CPU to the next speed, read on.

Upgrading versus buying a new PC

There are a number of ways to upgrade a system. You can switch to a faster processor, update the hard disk or add a better video card. Often, the fastest and cheapest way to improve performance is to add memory. In this review, *APC* examines all of these options, and tells you how much of a performance boost you can expect.

Of course, you need to be willing to crack open your PC and do some adjusting to make these options work. You should ensure that you have enough room for the upgrades and be prepared to do some fiddling with the software because things rarely work the first time in the world of computers. This is not a 'how-to' guide. If you need guidance, check out the archive of *APC* Workshop's Step by Step columns on the Web at http://apcmag.com/step/.

Despite any fond memories you have of your current PC, throwing it out and starting over may be the best answer in the end. The price of new systems is constantly falling and they won't have the bottlenecks of a jury-rigged old PC, so plan ahead before making a decision. Determine the source of the bottlenecks (graphics, hard disk, video, CPU and so on) and the parts you'll need to upgrade. Then work out the cost of the upgrade. It may be cheaper to buy a new system. There are inevitable software problems with non-standard, patched-together system, so keep this in mind when you make your decision.

You can often improve a new system or minimise its cost, however, by recycling the parts from an old one. Hard disks, monitors, keyboards and speakers are prime candidates for pillaging from older systems.

Don't forget the other stuff

There are a host of other things you can do to make your computing more productive and enjoyable. The changes may not increase the frame rate in Quake, but they may improve the experience. Considering the time many people spend at their computer, far too little thought goes into the ergonomic and aesthetic aspects of computing.

The most obvious place to start is the monitor. Sitting and staring for hours on end at the tiny, fuzzy 14in monitor that came with the computer three years ago isn't much fun, and it's probably hurting your eyes. Upgrading to a 15in model is a good start, but even 17in and 19in screens are now significantly cheaper. A lot of older monitors have trouble displaying resolutions above 800 by 600.

Another advantage of a new monitor is the ability to increase the resolution to 1,024 by 768 or higher (the pleasures of the extra space on your desktop should also not be underestimated). Prices are coming down on flat-panel LCD screens as well. *APC*'s reviewers find these screens much more pleasant to look at. Although the refresh rate is not always fast enough for games or full-screen video, LCD screens are easier on the eyes for all other uses.

PC vendors often include the cheapest keyboards and mice to lower costs. The differences between keyboards and mice are subtle, but investing in a more expensive keyboard or mouse can make your PC a lot easier and more comfortable to use in the long term. Opinion tends to be divided on ergonomic keyboards, such as Microsoft's Natural Keyboard — you either love them or hate them, but if you love them, they are a good investment. Keyboard manufacturers are also beginning to include 'quick launch' buttons that launch your favourite applications or allow you to control the CD player. Four or five-button mice are probably a little excessive for anyone except serious gamers, but a mouse with a scroll wheel can save a great deal of switching between the mouse and the keyboard.

If your PC doesn't have a soundcard, or if your system sounds like two aluminium cans connected by a piece of string, a new soundcard and a decent pair of speakers will make a world of difference. These items can add a whole new dimension to gameplay, and CD or MP3 sound quality. If you like online chatting, add a soundcard and a headset microphone and suddenly you can actually chat with people all over the world.

Planning for the future

It's often a good idea to leave room for future expansion in any system. The section on chipsets on page 94 gives you an indication of the direction in which system manufacturers are heading. In many cases, it is integration of components onto the motherboard, which is great for cost savings, but doesn't leave a lot of room for future upgrades.

If you are planning to get a new motherboard, it's probably good to know that Intel will be moving most of its processors to socket 370 within the next few years, while AMD will be focusing on Athlon. SDRAM is really the only choice of memory right now, but it might be worth trying to get PC133 SDRAM if you can, as you may be able to take it with you to your next PC.

Graphics are king

You need to know how you want to use your system when planning an upgrade. If you are interested mainly in office applications and Web surfing, you should go for a cheaper option (although it's definitely worth getting a 56K modem). If your needs are greater, you should opt for a card with more grunt.

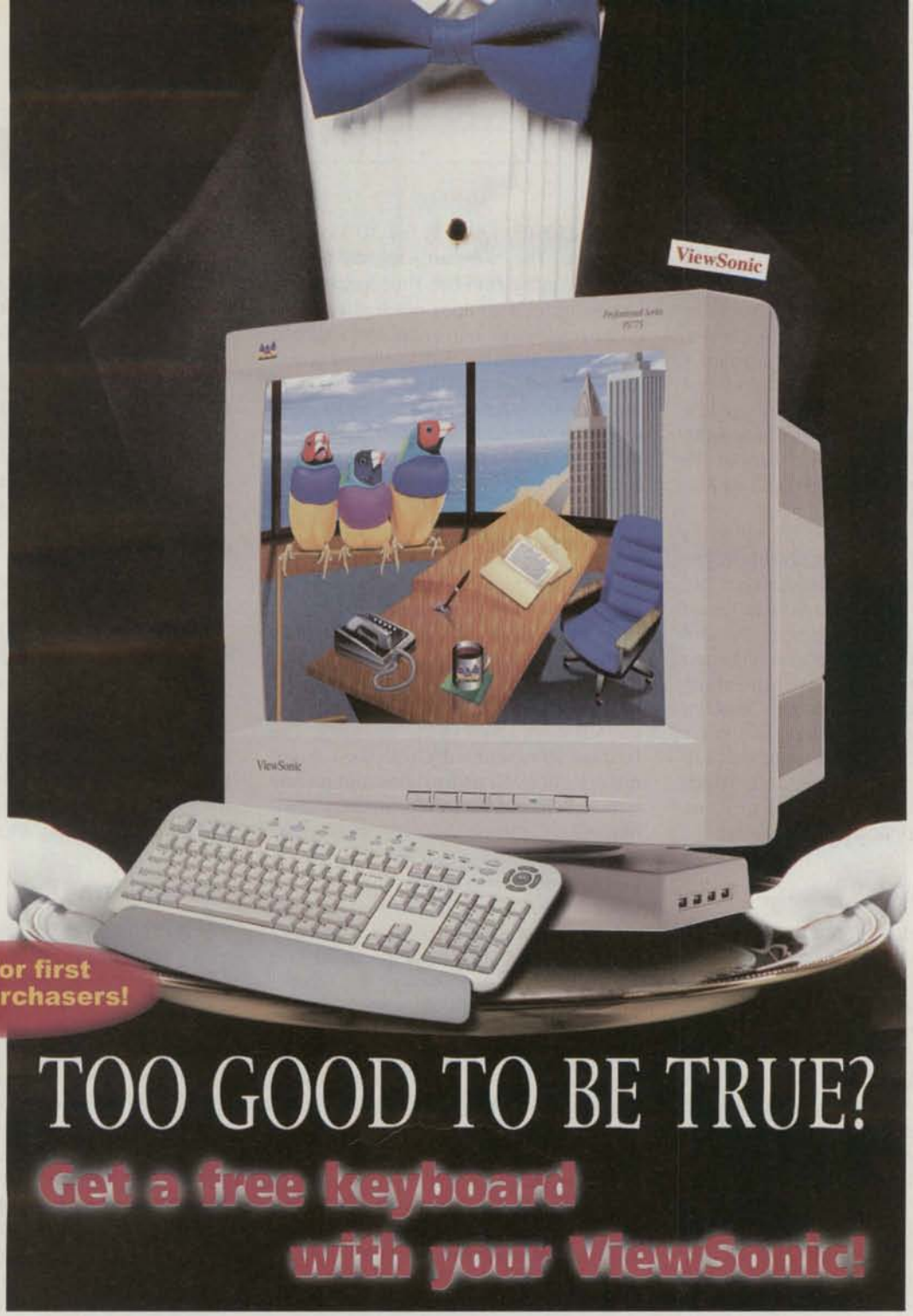
Possibly one of the most important developments, this year and next, will be the availability of transform and lighting in 3D accelerators. It may sound like an obscure technical issue, but it is crucial for the cost and performance of PCs.

Without a doubt, 3D graphics are one of the most significant drivers of high-end PCs in the consumer market. The primary reason Intel and AMD continue to sell increasingly powerful processors is the incredible demands 3D places on a system.

At present, a 3D scene is rendered in two stages, one handled by the processor, the other by the graphics card. The first stage, transform and lighting, organises the polygons on the screen and applies light levels. This is generally performed by the CPU. The second, rendering — the process of 'colouring in' the polygons — is undertaken by the graphics board.

High-end graphical workstations use graphics cards that can actually perform both the transform/lighting and rendering operations, offloading the burden from the CPU. Towards the end of this year, and early into next, we should see cards with this capability enter the consumer market. nVidia's GeForce 256 (formerly NV10), due for release late this year, is likely to be the first card to fit this mould.

Why is this so important? Simple — it provides fast 3D graphics without the need for a lot of CPU power. If you feel your 333MHz Celeron isn't giving you enough 3D grunt, you won't have to throw away the processor and buy a new CPU and possibly a new motherboard, you just need to buy a card with transform and lighting which will do most of the CPU's work for it. It's simple, neat and cheap — a better option than overhauling your system.



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Processors

APC tested a wide range of processors from Intel and AMD, which are the only two options currently available in Australia. A few Cyrix processors are available, but these appear to be old stock that predate the Via buyout, and it's uncertain when new Cyrix processors will be available. It's also uncertain when options such as Rise or IDT will be available.

We kept the system configuration as similar as possible for each processor. The processors' ability to perform integer and floating point calculations was tested using the Ziff-Davis CPUmark 99 and WinBench 99-FPU WinMark tests. To test 3D graphics performance, we ran Futuremark's 3D Mark 99 Max test suite, and ran a Timedemo frame rate test on Sierra's Half-Life game. Finally, we ran the Ziff-Davis Business Winstone 99 test, which performs a series of operations on common business applications.

Intel or AMD?

If you're trying to choose between Intel and AMD, the answer is, 'It depends what you're looking for'. If price is the major factor, an AMD K6-2 generally costs less than an equivalent Intel Celeron. Although the K6-2 may not fly, it won't crawl either. And even though Intel's 400MHz Celeron processor is a little cheaper than AMD's 400MHz K6-2, once you factor in the cost of a motherboard, you realise the AMD is easier on the budget.

AMD's K6-III is a different story. Thanks to its 64K level 1 and 256K on-chip level 2 caches, its performance in integer calculations is superb. The 450MHz K6-III achieved the highest score in CPUmark 99. It came third in Business Winstone 99, beating all of Intel's Celeron processors, as well as the 450MHz and 500MHz Pentium III processors. Considering a 450MHz K6-III is cheaper than a 450MHz Pentium III (and about the same price as a 500MHz Celeron), the K6-III is a very good buy if you want a fast PC for office applications or Web surfing.

However, AMD falls down in its floating point capabilities, which have a big impact on 3D games and multimedia applications. Only AMD's recently released Athlon challenges Intel's floating point performance. The AMD processors we tested all scored poorly in the WinBench 99-FPU WinMark and the 3D graphics tests. Intel's 400MHz and 433MHz Celeron processors beat AMD's 450MHz K6-III in the 3D Mark 99 Max tests. They were only slightly behind the K6-III in the Half-Life Timedemo test.

For top performance across the board, go the Intel Pentium III or the AMD Athlon. In recent tests on an AMD Athlon against an Intel Pentium III with similar hardware configurations running at the same clock speed (see *APC* September 1999, page 29), the AMD was equal to or better than a Pentium III and the price was similar.

Intel options

If you're buying Intel, you have to choose between a Pentium III and a Celeron processor. Celerons are significantly cheaper, but not necessarily inferior. The Pentium III has four times the cache of the Celeron, but the Celeron's cache runs at the full clock speed of the processor. The Pentium III runs at half clock speed. It also has a set of SIMD instructions that greatly enhances its multimedia processing capabilities.

Our tests revealed that the differences in performance between Pentium IIIs and Celerons at the same clock speed were not always that great. For uses such as office applications, Web browsing, email and most educational software, the advantages of a Pentium III are wasted, making the Celeron a better buy. For applications that require a powerful multimedia processor, such as image, video and sound editing, and 3D gaming, the Pentium III is a better choice.

If you're buying a Celeron processor, you have the additional choice of a motherboard using Intel's 810 chipset, which integrates graphics and sound processors in the motherboard. This is a good low-cost solution, but gamers will be disappointed with its graphics performance. In the 3D graphics tests, a 500MHz Celeron using the 810 motherboard's integrated graphics chip was no match for 400MHz and 433MHz Celerons using a 440BX motherboard and an nVidia Riva TNT graphics card.

Lazarus the PC

If your old system is due for the scrap heap, you can possibly forestall the inevitable by installing the Kingston Turbochip — an upgrade chip that lets you plug either a 233MHz Pentium MMX or a 366MHz K6-2 processor into any Socket 5 or Socket 7 PC (any computer with a minimum Pentium 75MHz). The Turbochip has a voltage regulator that allows it to run without having to adjust the processor voltage settings on your motherboard. Its internal clock multiplier means it will run at speeds higher than the motherboard supports.

The processor sits on top of a small printed circuit board (PCB) that also contains a few other components for the voltage regulator, so it is a bit larger than a regular processor. The Turbochip may not fit on your motherboard if there are other components too close to the processor socket. Kingston's Web site has a list of compatible motherboards and systems, including suggestions to get around common problems for each system. Check this list before you buy.

The other big issue is cost. For the price of a 366MHz Turbochip, you can buy a 350MHz or 400MHz AMD K6-2 processor, a new Socket 7 motherboard, 64M of memory and still have change to put towards a new graphics card. Although more complicated, it will give much better performance. Using a very similar configuration, the 400MHz K6-2 processor achieved almost one-and-a-half times the score of the 366MHz Turbochip in Business Winstone 99.

Bottom line

Upgrading the processor alone won't make your hard disk drive work much faster. The combination of motherboard and processor only made a 20% to 30% difference in disk performance between a 200MHz Pentium MMX processor and a 600MHz Pentium III processor. On a slow hard drive, the speed improvements for many applications will only be marginal, regardless of the processor speed.

For office applications, upgrading the processor noticeably improves the speed, but the difference between a $160 processor and a $1,300 processor is only about 30%. The advantage of a faster processor will be much more noticeable in 3D games and multimedia applications because of the intense processing power they require.

If you have a slow graphics card, the processor can only do so much to improve graphics performance. Conversely, a powerful graphics card will perform well even on a system with a slow processor. Soon-to-be-released graphics cards will do even more of the processing work, making the choice of processor less important.

As a final note, both Intel and AMD put high premiums on their top-of-the-range processors. A 600MHz Pentium III will set you back about $1,300, but a 500MHz Pentium III costs about $500. It's probably worth buying the second or third processor on the list. You'll have a performance loss of maybe 10% or 20%, but you'll save hundreds of dollars.

Results: Processors

Distributor	AMD	Intel	Kingston
Phone	(02) 9959 1937	(02) 9937 5800	(03) 9690 9699
Online	http://www.amd.com/	http://www.intel.com.au/	http://www.kingston.com/

Processor	CPUmark 99
AMD K6-III 450MHz	50.5
Intel Pentium III 600MHz	43.7
AMD K6-III 400MHz	42.2
Intel Pentium III 550MHz	42.2
Intel Pentium III 500MHz	39.1
Intel Celeron 500MHz	36.4
Intel Pentium III 450MHz	35.7
Intel Celeron 433MHz	33.1
Intel Celeron 400MHz	31.2
AMD K6-2 400MHz	29.3
AMD K6-2 450MHz	28.2
Kingston Turbochip 366MHz	11.4
Intel Pentium MMX 200MHz	9.7
Kingston Turbochip 233MHz	8.9

Processor	WinBench 99-FPU WinMark
Intel Pentium III 600MHz	3,030
Intel Pentium III 550MHz	2,810
Intel Celeron 500MHz	2,680
Intel Pentium III 500MHz	2,560
Intel Celeron 433MHz	2,320
Intel Pentium III 450MHz	2,310
Intel Celeron 400MHz	2,140
AMD K6-III 450MHz	1,520
AMD K6-2 450MHz	1,490
AMD K6-III 400MHz	1,350
AMD K6-2 400MHz	1,330
Kingston Turbochip 366MHz	1,150
Kingston Turbochip 233MHz	855
Intel Pentium MMX 200MHz	770

Processor	3DMark 99 Max
Intel Pentium III 550MHz	4,850
Intel Pentium III 600MHz	4,810
Intel Pentium III 500MHz	4,661
Intel Pentium III 450MHz	4,384
Intel Celeron 433MHz	3,462
Intel Celeron 400MHz	3,301
AMD K6-III 450MHz	2,912
Intel Celeron 500MHz	2,835
AMD K6-III 400MHz	2,768
AMD K6-2 450MHz	2,588
AMD K6-2 400MHz	2,456
Kingston Turbochip 366MHz	1,686
Kingston Turbochip 233MHz	1,308
Intel Pentium MMX 200MHz	1,106

Processor	Half-Life Timedemo (fps)
Intel Pentium III 600MHz	36.4
Intel Pentium III 550MHz	32.4
Intel Pentium III 500MHz	30.4
Intel Pentium III 450MHz	28.1
AMD K6-III 450MHz	24.8
Intel Celeron 433MHz	24.6
Intel Celeron 400MHz	24.3
AMD K6-III 400MHz	22.9
Intel Celeron 500MHz	22.4
AMD K6-2 450MHz	17.8
AMD K6-2 400MHz	16.7
Kingston Turbochip 233MHz	15.9
Kingston Turbochip 366MHz	15.6
Intel Pentium MMX 200MHz	14.2

Processor	Price*
Intel Pentium III 600MHz	$1,300
Intel Pentium III 550MHz	$965
Kingston Turbochip 366MHz	$521 (RRP)
Intel Pentium III 500MHz	$510
Intel Pentium III 450MHz	$380
AMD K6-III 450MHz	$370
Intel Celeron 500MHz	$355
AMD K6-III 400MHz	$280
Kingston Turbochip 233MHz	$239 (RRP)
Intel Celeron 433MHz	$200
AMD K6-2 450MHz	$195
AMD K6-2 400MHz	$165
Intel Celeron 400MHz	$160
Intel Pentium MMX 200MHz	N/A

*Estimated street price, unless otherwise noted

Disclaimer

All products used in these tests are shipping versions available to the public at the time of publication, unless otherwise stated.

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These tests were performed without independent verification by Ziff-Davis, and Ziff-Davis makes no representation as to the results.

Processor	Business Disk WinMark
Intel Pentium III 600MHz	2,710
Intel Pentium MMX 200MHz	2,090

Processor	High-End Disk WinMark
Intel Pentium III 600MHz	8,400
Intel Pentium MMX 200MHz	6,950

Processor	Business Winstone 99
Intel Pentium III 600MHz	25.2
Intel Pentium III 550MHz	24.7
AMD K6-III 450MHz	23.9
Intel Pentium III 500MHz	23.5
AMD K6-III 400MHz	23.2
Intel Pentium III 450MHz	22.6
Intel Celeron 500MHz	21.6
Intel Celeron 433MHz	21.3
Intel Celeron 400MHz	20.4
AMD K6-2 450MHz	20.3
AMD K6-2 400MHz	19.6
Kingston Turbochip 366MHz	12.7
Kingston Turbochip 233MHz	11.6
Intel Pentium MMX 200MHz	10.7

Testing configurations

K6-2 and K6-III processors were tested on an FIC PA-2013 motherboard with 128M of PC100 SDRAM, an STB Velocity 4400 graphics adaptor using an nVidia Riva TNT graphics chip with 16M of SDRAM and an 8.4G Seagate hard disk drive. Pentium III and 400MHz and 433MHz Celeron processors were tested on a Supermicro P6SBU motherboard with the same memory, graphics card and hard disk drive. The Pentium and Kingston Turbochip processors were tested on a Digital Venturis FX motherboard with the same memory and hard disk drive, an S3 Trio 64V2/GX display adaptor with 2M of SDRAM and a Guillemot Maxi Gamer 3D2 3D accelerator card using a Voodoo2 chip and 12M of RAM. The 500MHz Celeron was tested on a Supermicro 370SWD motherboard using the same memory and hard disk drive, but using the motherboard's built-in Intel 810 chipset graphics adaptor with 4M of RAM.

Prices listed are either recommended retail prices provided by vendors or estimates based on street prices at time of writing. Readers should check with vendors for current prices.

Chipsets

Chipset choice is not about performance — it's about getting the right type of motherboard for your processor. There *are* differences in performance between chipsets and even motherboards using the same chipset, but they tend to be small when compared to other system choices.

There are currently a number of slot choices. The most common is Slot 1, the interface used by Pentium II and Pentium III processors (and older Celerons). Intel recently began producing a Celeron-based CPU in the socket 370 form, which only fits in an appropriate motherboard. Intel also has Slot 2 chipsets for Xeon processors, which we have not listed here because they are more suitable for the workstation and server buyer. Several older slot types are still around, including the Socket 7 chipsets for Pentium and Pentium MMX processors, and Socket 8 motherboards for the now-defunct Pentium Pro.

If you're buying an AMD chip, you need either a Super7 motherboard or, in the case of Athlon, an Athlon motherboard. Super7 is an extension of Socket 7, and it enables faster chips via a 100MHz frontside bus and provides extra features like AGP, which were not originally present in the Socket 7 design. Super7 motherboards are compatible with Socket 7 chips, but not vice versa.

Features

Most motherboards still have ISA slots, and only Intel's 810 does not support ISA natively. However, it is slowly being phased out. All currently available motherboards support PCI, and the vast majority also now support AGP and USB. If you have a very old motherboard that uses VESA slots, it's time to upgrade. The number of slots is determined more by the limitation of motherboard space than any intrinsic feature of the chipset, although most chipsets are limited to five or six PCI slots.

All currently available PC chipsets are supplied with an interface for hard disk storage — some with the 33M per second Ultra ATA/33 interface, others with the new Ultra ATA/66. A few motherboards are delivered with integrated SCSI interfaces, but rarely as part of the actual chipset.

The frontside bus (FSB) speed indicates the speed at which the processor can communicate with the system's memory. Faster processors require faster FSBs. Processors work on a simple multiple of the FSB, for instance a 450MHz Pentium III has a 4.5x multiplier and runs on a 100MHz FSB. To run at 100MHz or more, however, you need special PC100 (or PC133 for 133MHz) memory, which can cost a little more than standard SDRAM. Most chipsets can run at FSB speeds slower than listed (the Intel 440BX can also run at 66MHz, for instance), and many motherboard manufacturers make their systems overclockable by allowing faster-than-normal FSB speeds.

When it comes to memory, there's only really one choice: SDRAM. It is now ubiquitous and all current chipsets support it. Many also support EDO and FPM memory, although getting hold of these older memory types could be difficult. Most chipsets are also designed to support dual inline memory modules, but some still support the older sockets used by single inline memory modules (SIMMs). A new type of memory, planned for release next year, is RDRAM, which comes in Rambus inline memory module (RIMM) format.

Dual processing is rare in chipsets, and even more so in motherboards. It might be a good option if you plan on upgrading to Windows 2000 or using a multiprocessor operating system like BeOS or Linux. You don't need to fill both slots of a multiprocessor motherboard immediately; you can leave a slot free for future upgrades.

Chipset integration

Recent efforts to develop lower-cost computers have led to some highly integrated chipsets from Intel and SiS. Motherboards based on the Intel 810 and 810-e chipsets, or one of numerous SiS chipsets, now tend to incorporate features such as audio, video and networking directly onboard. This reduces a system's flexibility, but the cost benefits are significant. The SiS 630 chipset, for instance, integrates 3D video, audio and Fast Ethernet features directly into the chipset, offering a potential saving of $500 to $600 on overall system cost.

Results: Chipsets

	Slot type(s)	AGP/USB support	Max memory slots/type	Maximum FSB speed	IDE interface
ALi Aladdin IV+	Socket 7	No/Yes	4/SDRAM DIMMs or 8 EDO SIMMs	83.3MHz	Ultra ATA/33
ALi Aladdin Pro II	Slot 1 or socket 370	2x/Yes	4/PC100 SDRAM DIMMs	100MHz	Ultra ATA/33
ALi Aladdin V	Super7	2x/Yes	4/PC100 SDRAM DIMMs	100MHz	Ultra ATA/33
AMD 750	AMD Athlon	2x/Yes	3/PC100 SDRAM DIMMs	200MHz Alpha Bus	Ultra ATA/66
Intel 440BX	Slot 1	2x/Yes	4/PC100 SDRAM DIMMs	100MHz	Ultra ATA/33
Intel 440EX	Slot 1 or socket 370	2x/Yes	2/SDRAM DIMMs	66MHz	Ultra ATA/33
Intel 440LX	Slot 1 or socket 370	2x/Yes	4/SDRAM DIMMs	66MHz	Ultra ATA/33
Intel 440ZX	Slot 1	2x/Yes	2/PC100 SDRAM DIMMs	100MHz	Ultra ATA/33
Intel 440ZX66	Slot 1 or socket 370	2x/Yes	2/SDRAM DIMMs	66MHz	Ultra ATA/33
Intel 810	Slot 1/socket 370	Integrated/Yes	2/PC100 SDRAM DIMMs	66MHz	Ultra ATA/66
SiS530	Super7	Integrated/Yes	3/PC100 SDRAM DIMMs	100MHz	Ultra ATA/66
SiS540	Super7	Integrated/Yes	3/PC100 or PC133 SDRAM DIMMs	100MHz	Ultra ATA/66
SiS600	Slot 1	2x/Yes	3/PC100 SDRAM DIMMs	100MHz	Ultra ATA/33
SiS620	Slot 1 or socket 370	Integrated/Yes	3/PC100 SDRAM DIMMs	100MHz	Ultra ATA/66
SiS630	Slot 1 or socket 370	Integrated/Yes	3/PC100 or PC133 SDRAM DIMMs	133MHz	Ultra ATA/66
Via Apollo KX133	AMD Athlon	4x/Yes	4/PC100 or PC133 SDRAM DIMMs	200MHz Alpha Bus	Ultra ATA/66
Via Apollo MVP3	Super7	2x/Yes	3/PC100 SDRAM DIMMs	100MHz	Ultra ATA/33
Via Apollo MVP4	Super7	2x/Yes	3/PC100 SDRAM DIMMs	100MHz	Ultra ATA/66
Via Apollo Pro	Slot 1 or Socket 8	2x/Yes	4/PC100 SDRAM DIMMs	100MHz	Ultra ATA/33
Via Apollo Pro +	Slot 1 or socket 370	2x/Yes	4/PC100 SDRAM DIMMs	100MHz	Ultra ATA/33
Via Apollo Pro133	Slot 1 or socket 370	2x/Yes	4/PC100 or PC133 SDRAM DIMMs	133MHz	Ultra ATA/66

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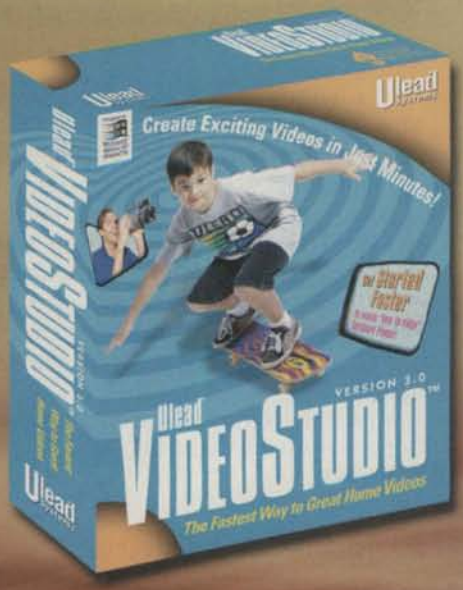

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Memory

People often say that the best way to upgrade your system is simply to add memory. Virtual memory, the use of hard disk space in lieu of actual memory, is commonly used by operating systems and applications and can slow a system down big-time. On a 128M system, a Windows 98 installation sucked up about 37M of real memory and 23M of virtual memory, and that was before any applications were run. You might surmise that 16M or even 32M just doesn't cut it anymore, and you'd be right. The very minimum memory requirement is now 64M, but 128M is preferable.

The good news is that memory is now extremely affordable. An extra 64M will only cost about $125, which is less than most software titles. Adding another 128M will set you back about twice that. The bad news is that if you want anything other than SDRAM DIMMs (if you have an old system, for instance), you have to search a bit.

Application memory use

We measured the memory use of some common applications in order to provide an indication of modern systems' memory requirements. After reboot, we measured the system memory and virtual memory use, then measured again after launching an application and opening a large file in that application. The results in the graph below represent the difference in the amount of memory and virtual memory used.

We should note that these tests are by no means definitive. The vagaries of Windows memory management and the size of files opened will vary application memory use considerably. Applications such as the various components of an office suite share some DLLs, so the total memory used when opening multiple applications may be less than the sum of the individual parts. Consequently, your mileage may vary.

The results are quite staggering, even when you take into account Windows 98's memory management system and the loading of DLLs and other OS features required to launch applications. Microsoft Word, for instance, added over 22M to real memory and 8.5M to virtual memory use after it was launched. Internet Explorer added 22.3M to total memory use. Other applications produced similar figures.

And to think that once upon a time Bill Gates was saying that 640K was all we'd ever need.

Performance and virtual memory

It's always been hard to measure the performance improvement provided by additional memory. Common benchmarks run only a single application at a time, and are designed to tax the CPU rather than the memory subsystem (above a certain memory level, there is no performance improvement). In reality, however, people tend to open numerous applications at once, and each places an additional burden on memory and forces the computer to delve into virtual memory, and therefore degrading performance.

To test the effects of the use of virtual memory, we came up with a series of simple tests. The first involved opening Photoshop and running a set of filters on a huge (80M) TIFF file. On the file, we ran the gaussian blur, the find edges stylize filter and the sumi-e brush strokes filter, and timed their completion. The tests resulted in some spectacular differences in performance in Photoshop, particularly for the first two filters. The difference between a system with 32M and 64M was significant, and there was a further big jump between 128M and 264M.

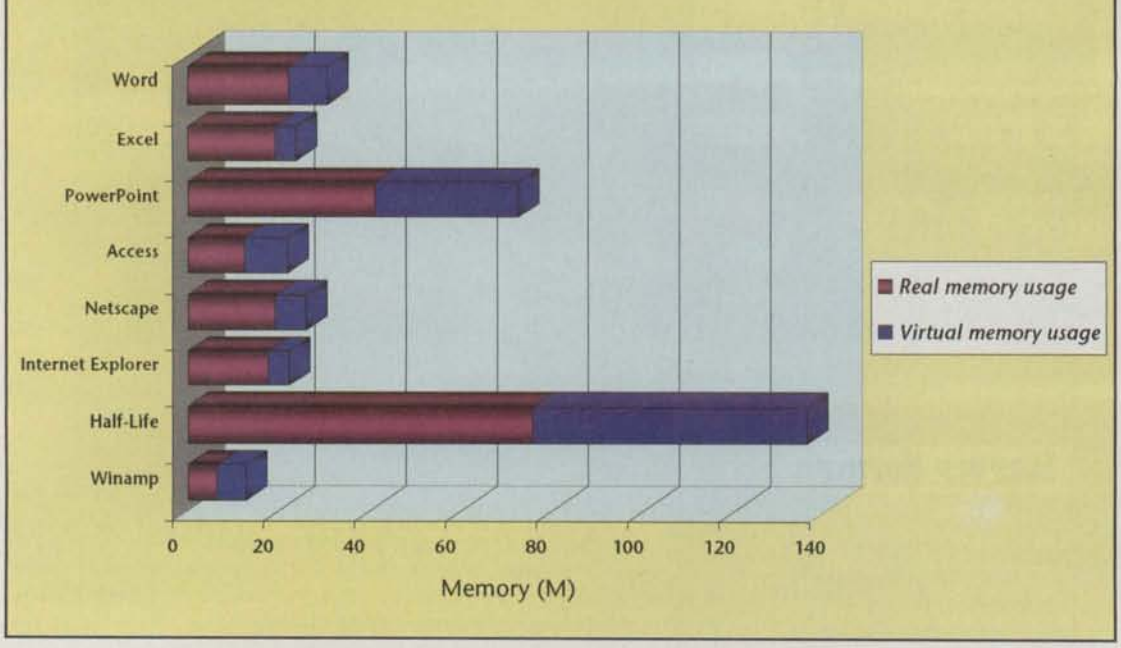
Finally, we tested Half-Life to see how a game is affected by memory. There was a fair hike between 32M and 64M, although beyond that, performance increases were minimal.

Results: Memory performance tests*

Memory	Photoshop: gaussian blur (min:sec)	Photoshop: stylize: (min:sec)	Photoshop: brush strokes: sumi-e (min:sec)	Half-Life frame rate find edges (min:sec)
32M	2:12	2:10	3:55	27.6
64M	1:25	1:22	3:45	33.4
128M	1:19	1:12	3:40	33.9
256M	0:35	0:28	3:42	34.1

*Lower results indicate better performance

Memory usage of applications



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Video cards

In our recent 3D AGP graphics card review (see *APC* August, page 106), we noted that it wasn't so long ago that a PC came with 32M of RAM as a standard configuration. These days, a leading-edge 3D graphics card packs in just as much, but it is set aside solely to crunch pixels. So, do you need one of these cards or will a second-hand card do the trick?

2D or not 2D

It's nearly impossible to buy a graphics card that doesn't promise 3D processing powers of one kind or another. One of the most important questions you need to ask, especially if you have an older system, is whether your machine can handle a new card.

You need to know whether your motherboard has an AGP slot or just a PCI. If you are considering a Voodoo/Voodoo2 3D add-on card, you need to have a free PCI slot. If your motherboard does not have an AGP slot and you're thinking of upgrading it, beware. You may also need a new PC case to fit the new board in. In addition, some older (but cheaper) motherboards may not have the power requirements to handle a 3D graphics card, for example, the nVidia Riva TNT AGP cards and some motherboards based on the LX chipset. You should check with the manufacturers before making a purchase.

Trials and tribulations

We ran a huge collection of PCI and AGP video cards through our usual battery of tests to see how they performed (see 'How we tested', page 99). If you look at the tables on pages 98 and 99, you'll notice that each card uses a different graphics processor. You should be able to expect similar performance from other cards using the same chips.

A PCI upgrade

For those upgrading a PCI system, we have started with a very basic Diamond Stealth 64 (or Diamond GT) with 8M onboard, based around the S3 Vision964 chipset — one of the older 64-bit chips — and upgraded from there.

No matter what we did, we couldn't get a starting result for either the Ziff-Davis Business Graphics WinMark 99 or the High-End Graphics WinMark 99 tests. Surprisingly, and after over 24 hours to complete the test, the Stealth 64 returned a score of 11.9 in the 3D WinBench 99. This is 2.1% of the score achieved by the slowest AGP card from the August roundup — not surprising since it uses the Direct3D software renderer. Running the Half-Life Timedemo in 800 by 600 mode nabbed us 8.4fps, slightly higher than expected, but not passable by a long shot.

One of the first upgrade paths we tested was with Voodoo cards. We rated four cards, two PCI add-on cards (which work alongside your existing 2D card and provide only 3D processing), and two stand-alone 2D/3D Voodoo cards.

Looking at the results, you can see that a Voodoo card increased the system's 3D capabilities enormously. (Because Voodoo add-on cards can only run at a maximum resolution of 640 by 480, that is how we tested 3D WinBench 99 and Half-Life. We tested the video cards that could handle higher resolutions at those settings to a maximum 1,024 by 768.) When we installed the Voodoo2 card, there was a greater leap in performance. It was two-and-a-half times faster in 3D WinBench 99.

The next Voodoo upgrade was to a Guillemot Maxi Game Phoenix PCI board, a Voodoo Banshee 2D/3D card which replaced the S3 board. This card was capable of running the tests at a maximum of 800 by 600, which dropped the frame rate slightly in Half-Life. This meant it returned a lower score in 3D WinBench 99, but it excelled in every other respect. Video processing was excellent. It scored two to three times higher in the other graphics benchmarks.

The final PCI card we installed was an ATI 3D Rage Pro card with 8M of RAM. This is one of the earlier 2D/3D cards to reach the market, and it yielded some interesting results. In 2D it easily outperformed all of the Voodoo add-on cards, but was slower in 3D. Its testing resolution was higher than the Voodoo and Voodoo2, but for better 3D results we suggest dropping it back down.

Results: Video cards

	ATI 3D Rage Pro	ATI Xpert 128	Diamond Stealth 64	Diamond Stealth 64 with Voodoo card	Diamond Stealth 64 with Voodoo2 card	GA-660
Graphics processor	ATI Rage Pro PCI	ATI Rage 128GL	S3 Vision964	3dfx Voodoo	3dfx Voodoo2	nVidia Riva TNT2
Video memory	8M	16M SDRAM	8M	4M	12M	32M SDRAM
Connection type	PCI	2x AGP	PCI	PCI	PCI	4x AGP
Business Graphics WinMark 99	127	167	Unable to run	48.1	50.1	173
High-end Graphics WinMark 99	329	461	Unable to run	Unable to run	210	474
3D WinMark 99	174 (at 800 by 600)	577	11.9	251 (at 640 by 480)	678 (at 640 by 480)	856
WinMark 99 video Indeo, 640 by 480 (frames dropped)	0	0	159	154	158	0
MPEG-1 CPU utilisation (%)	28	25.3	68.1	68.3	68	25.6
MPEG-1 (max fps)	84.7	136	46.2	45.8	46.3	84.7
MPEG-1 (frames dropped)	0	0	0	0	0	0
Half-Life Timedemo at 800 by 600 (fps)	11.86	19.56	8.4	34.8	34.9	30.2

Farewell PCI, hello AGP

When AGP was first released in 1997, it was an evolutionary step in the life of graphics processing. Gone was the 133Mbps bottleneck of PCI, and the new 3D graphics card was capable of churning up to twice that amount. AGP at 2x can reach a maximum of 533Mbps, and the latest 4x ports have a maximum throughput of 1.07Gbps.

We were able to test a 1x AGP card, the MS-4413 Permedia2 graphics board from 3Dlabs. Even this card was only capable of displaying 3D in 640 by 480, and it didn't come out on top in our 3D tests. This is not so much a reflection on AGP, but more on the quality of the card. Its 2D scores, and those achieved by the 2x AGP cards (Maxi Gamer Phoenix and the ATI Xpert 128), were quite similar, but an increase in video memory, faster chips and faster AGP slots yield huge 3D-processing returns. We were able to get results of up to four to five times the speed and frame rates with these cards.

At the top of the performance heap are the Matrox G400, the Voodoo3 and RivaTNT2. All of these cards performed outstandingly across the tests and are the cards of choice for power users.

Who needs a card anyway?

For one of our final tests, we put one of the latest i810 motherboards with integrated video through our test suite. The chipset has the Intel i752 2D/3D processor built in. This processor is low to mid on the scale, but may be a cheaper alternative to upgrading your motherboard and video card.

It performs well with 2D — slower than the latest cards, but not much. It falls down slightly in crunching video and 3D, but it still passes muster. In our Half-Life Timedemo it managed 22.4fps at 800 by 600, which is slower than the frame rate shown on television, but still passable.

Finally, not all of the graphics cards we tested are readily available. With all *APC*'s contacts and connections, we were still hard-pressed to find PCI versions of the cards we wanted, especially the older models. Thank you to Servex, Ubi Soft and Creative for digging up some for us.

How we tested

We tested the video cards on a Dell Dimension XPS R450 with a 450MHz Pentium II processor and 128M of RAM running Windows 98. The video cards used either a PCI or 2x AGP slot. An obvious exception was the i810 motherboard, which we reviewed as a full system in *APC* September (see page 38). Every card had the latest drivers installed for maximum performance.

When a card was unable to run at the proper testing resolution of 1,024 by 768, we lowered the resolution to the card's maximum, and forced the tests through. This may give slightly skewed results, but we have noted this in the results chart when it happened.

We ran Ziff-Davis' 3D WinBench 99 and WinBench 99 benchmarking programs, plus a Timedemo in Half-Life to test the graphics cards.

3D WinBench 99 measures a card's ability to render simple to complex 3D video. This benchmark also includes 59 quality tests that detail which 3D subsets a card is able to perform.

Business and High-End Graphics WinMark 99 are part of WinBench 99. They measure the system's graphics performance when performing video tasks associated with common business applications, and demanding multimedia and 3D applications. We also tested the cards' capabilities when displaying full-screen video.

Our final test involved running a **Timedemo** in Half-Life, a 3D game from Sierra. We ran this demo at 800 by 600 (if the card was able to) with the appropriate rendering driver; either the 3dfx mini driver in OpenGL, the card's own OpenGL driver or Direct3D. This tested the card's fps when running the game full screen.

Results: Video cards

	i810 motherboard	Matrox Millennium G400	Maxi Gamer Phoenix	MS-4413 3Dlabs Permedia 2	Savage4	Voodoo3
Graphics processor	Intel i752	Matrox G400	3dfx Voodoo Banshee	3Dlabs Permedia 2	S3 Savage4	3dfx Voodoo3
Video memory	Variable	32M SDRAM	16M	8M SDRAM	32M SDRAM	16M SDRAM
Connection type	Integrated	4x AGP	PCI	1x AGP	4x AGP	2x AGP
Business Graphics WinMark 99	142	184	163	144	152	170
High-End Graphics WinMark 99	412	496	443	467	454	474
3D WinMark 99	376	933	504 (at 800 by 600)	164 (at 640 by 480)	769.5	831
WinMark 99 video Indeo, 640 by 480 (frames dropped)	146	0	0	183	78	0
MPEG-1 CPU utilisation (%)	38.5	24.7	26.3	65.2	31.3	25.2
MPEG-1 (max fps)	94.7	84.6	84.9	47.8	105	84.8
MPEG-1 (frames dropped)	5	0	0	0	124	0
Half-Life Timedemo at 800 by 600 (fps)	22.4	unavailable	32.6	9.32	26.7 (at 1,024 by 768)	34.8

Results: Video cards*

Key for 3D results
✓ Capable: the card is capable of the given feature
✗ Not capable: the card is not capable of the given feature
∅ Incorrect: the card's driver claimed to support the given feature, but under our testing conditions the card was found to perform this feature incorrectly

3D WinBench 99 quality tests	ATI 3D Rage Pro	ATI Xpert 128	Diamond Stealth 64 with Voodoo add-on card	Diamond Stealth 64	Diamond Stealth 64 with Voodoo2 add-on card	GA-660	Intel i810 motherboard	Matrox Millennium G400 MAX	Maxi Gamer Phoenix	MS-4413 3Dlabs Permedia 2	Savage4	Voodoo3
Flat shading	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Gouraud shading	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Dithering	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Z-buffer	∅	✓	∅	✓	✓	✓	✓	✓	✓	✓	✓	✓
Perspective correct textures	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Nearest	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Linear	✓	✓	✓	✓	✓	✓	✓	✓	✓	∅	✓	✓
Nearest mipmap nearest	✓	✓	✓	✓	✓	✓	✓	✓	✓	∅	✓	✓
Nearest mipmap linear	✓	✓	✓	✓	✓	✓	✓	✓	✓	∅	✓	✓
Linear mipmap nearest	✓	✓	✓	✗	✗	✓	✗	✓	✗	∅	✓	✓
Linear mipmap linear	✓	✓	✓	✗	✗	✓	✗	✓	✗	∅	✓	✓
Mipmap LOD bias	✓	✓	✓	✗	✗	✓	✓	✗	✗	∅	✓	✗
Modulate texture blending	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Decal texture blending	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
DecalAlpha texture blending	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
ModulateAlpha texture blending	✓	✓	✓	✓	✓	✓	✓	✓	✓	✗	✓	✓
Flat wrap texture addressing	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Cylindrical wrap u	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Cylindrical wrap v	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Clamp texture addressing	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Mirror texture addressing	✓	✗	✓	✗	✗	✓	✓	✗	✓	✓	✓	✓
Cull counterclockwise	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Cull clockwise	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Cull none	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Fog vertex linear	∅	✓	∅	✓	✓	✓	✓	✓	✓	✓	✓	✓
Fog table linear	✗	✗	✗	✓	✓	∅	✗	✓	✓	✗	✓	✓
Fog table exponential	✗	✗	✗	∅	∅	∅	✗	✓	∅	✗	✓	∅
Specular highlights	✓	✓	✓	✓	✓	✓	✓	✓	✓	∅	✓	✓
Colour key transparency	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Alpha transparency	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

*See disclaimer on page 94

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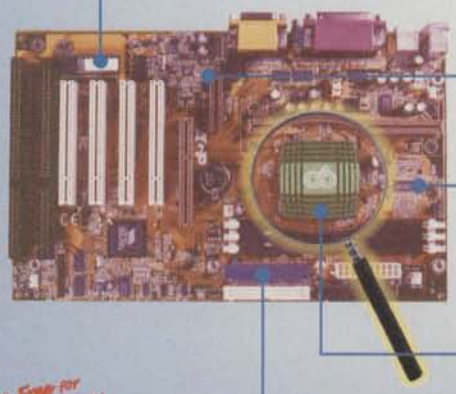

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Results: Video cards*

3D WinBench 99 quality tests	ATI 3D Rage Pro	ATI Xpert 128	Diamond Stealth 64 with Voodoo add-on card	Diamond Stealth 64	Diamond Stealth 64 with Voodoo2 add-on card	GA-660	Intel i810 motherboard	Matrox Millennium G400 MAX	Maxi Gamer Phoenix	MS-4413 3DLabs Permedia 2	Savage4	Voodoo3
Source alpha pixel blending	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Add pixel blending	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Modulate pixel blending	∅	✓	∅	✓	✓	✓	✓	✓	✓	∅	✓	✓
Modulate 2x pixel blending	∅	✓	∅	✓	✓	✓	✓	✓	✓	∅	✓	✓
Alpha vertices	✓	✓	✓	✓	✓	✓	✓	✓	✓	✗	✓	✓
Perspective correct alpha	∅	∅	∅	∅	∅	✓	∅	∅	∅	✗	✓	∅
Alpha comparison greater than	✓	✓	✓	✓	✓	✓	✓	✓	✓	✗	✓	✓
Alpha comparison greater than or equal	✓	✓	✓	✓	✓	✓	✓	✓	✓	✗	✓	✓
Alpha comparison less than	✓	✓	✓	✓	✓	✓	✓	✓	✓	✗	✓	✓
Alpha comparison less than or equal	✓	✓	✓	✓	✓	✓	✓	✓	✓	✗	✓	✓
Z comparison greater than	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Z comparison greater or equal	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Z comparison less than	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Z comparison less than or equal	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Z accuracy	∅	✓	∅	✓	✓	✓	✓	✓	✓	✓	✓	✓
Z bias	✗	✗	✗	✗	✗	✗	∅	✗	✓	✗	✗	∅
Anti-aliasing 640 by 480	✗	✓	✗	✗	✗	✗	✗	✓	✗	✓	✗	✗
Triangle rasterisation	∅	✓	∅	∅	∅	✓	✓	✓	✓	∅	✓	✓
Texture fidelity	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Texture swapping	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
High triangle count	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Fog vertex and colour key	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Fog vertex and alpha	✓	✓	✓	∅	∅	✓	✓	✓	✓	✓	✓	✓
Alpha and linear	✓	✓	✓	✓	✓	✓	✓	✓	✓	∅	✓	✓
Alpha and linear mipmap linear	✓	✓	✓	✗	✗	✓	✗	✓	✗	∅	✓	✓
Small triangles	∅	✓	∅	✓	✓	✓	✓	✓	✓	✓	✓	✓
Perspective correct colour	∅	∅	∅	∅	∅	✓	∅	∅	∅	∅	✓	∅
Perspective correct specular	∅	∅	∅	∅	∅	✓	∅	∅	∅	∅	✓	∅
Anti-aliasing 1,024 by 768	✗	∅	✗	✗	✗	✗	✗	✓	✗	∅	✗	✗

*See disclaimer on page 94

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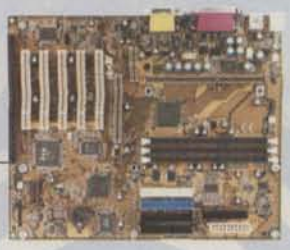

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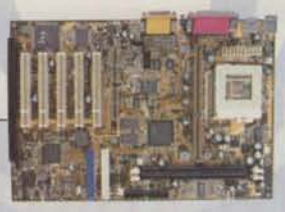

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The upgrade road 1999

Have you ever wondered how easy it is to build a PC? Last year, **Simon Vandore** converted a decrepit old PC into a relative speedster. The project was so cost-effective, he decided to do it again. Although the final result was a success, you have to wonder if the savings justify the effort.

In my lounge room, next to the black television, VCR and amplifier is a black desk with two PCs on it. Visitors are startled, appalled by my geekiness. However, most are impressed when I play Half-Life or FIFA 99 on the television, and the room shudders with the hi-fi bass of explosions or bouncing footballs. The combination also works well for streamed Netcasts, or to quickly look up something on the Internet Movie Database (http://www.imdb.com/) after a video night.

The first of my two PCs, known as Beck, is an upgraded Osborne Pentium 75MHz. Early last year I converted it to a K6-200MHz with 64M of RAM. I wrote about Beck in *APC* August 1998. Thank you to all the readers who sent feedback and advice on fixing my parallel port, which stopped working when I added a Promise Ultra33 card. Beck is still going strong and is now primarily a Linux machine.

My new PC, called Tale, is as much of a performance machine as could be built early this year for under $1,000. This meant using the overlocker's favourite combination of an Abit BH6 motherboard with a Celeron running at 300A running at 450MHz. Add 128M of PC100 SDRAM, a Riva TNT graphics card and an 8.4G hard disk, and it's an entertainment machine, as well as (ahem) a serious productivity tool.

So this is the tale of Tale, which actually started life with a different motherboard. I obtained a second-hand Soyo 6KB LX board and then went shopping for a Celeron processor (I wanted a Celeron 333MHz but the shop I went to only had the 300A in stock), an ATX case, a 240W power supply and a stick of RAM. I bought 100MHz SDRAM to future-proof my machine against processor upgrades.

The first adventure was carrying it all home. I'd underestimated the size and weight of the case, and to reach the nearest bus stop I had to walk a few strenuous kilometres with a huge cardboard box clutched in front of me, under my chin! I collected a preloved Intel i740 graphics card from a colleague and soon my lounge room floor was a mess of packaging, screwdrivers and silicon. I scavenged Beck's AWE64 soundcard, slave hard disk, 3dfx Voodoo card and 32x CD-ROM drive (replacing it with an old 2x recently discarded by a relative), and started building.

The first problem I encountered was that the screw holes on the power supply didn't match those on the case. This wasn't going to stop me from trying the Celeron, so as a temporary measure I strapped it firmly in place with masking tape. I then tried attaching the motherboard without the Soyo instructions (which had been lost by the previous owner). Slot 1 CPU supports are ridiculous and fiddly, but eventually I had the whole clumsy thing together. I pressed the power button in anticipation. The result was a loud bleep followed by the message 'Unknown CPU type'. The computer locked up.

After various Internet searches I discovered the Soyo motherboard required a BIOS upgrade to recognise the new 300A and its 128K level 2 cache. The catch-22 was that to upgrade the BIOS I needed a working CPU! While trying to borrow one from a reluctant colleague, I heard a rumour that 99% of 300As could run at 450MHz if used with a motherboard that supported a 100MHz bus speed. The Soyo

only offered 66MHz, so temptation led to a lunchtime purchase of an Abit BH6 BX board, which allows the user to choose from a number of bus speeds and voltage settings in its SoftMenu BIOS (as opposed to using jumpers). This is ideal for overclocking. I patted myself on the back for choosing quality RAM and headed home to try again, certain I would be happy even if the Celeron only ran at its default speed.

Replacing the motherboard meant rebuilding the system from scratch, but it worked and I now had a speedy new Pentium II-class PC. Beck was left a little underpowered and even lost its monitor to the newcomer. Lucky for me, the same relative who discarded the 2x CD-ROM drive also donated an old 14in VGA monitor, which I managed to fit on the computer desk. This sort of basic equipment is surprisingly easy to come by, because many people are replacing their now worthless 386 or 486 machines.

Tale crashed quite often under Windows 95B. Many patches and extras have to be added to that operating system on an ATX motherboard (to support USB and other functions), and this PC didn't seem to like them. A clean installation of Windows 98 fixed all of Tale's woes, as it automatically supported everything that was required. I experienced the reverse problem when running Windows 98 on the non-ATX Beck, which is much more stable under 95B (not to mention Linux!).

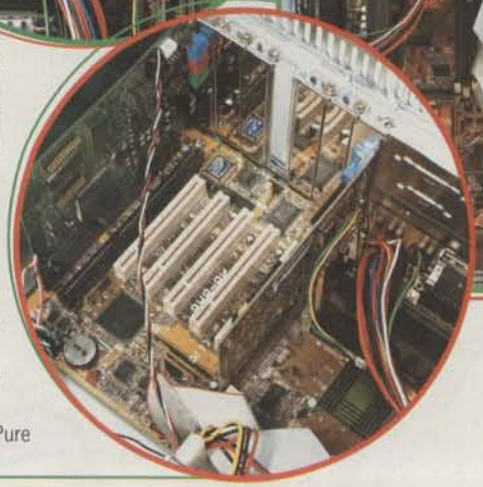
Everything was going so well that I had time to experiment with overclocking. I rebooted the machine after setting the bus speed to 100MHz and soon saw Windows again. This was now a *very* fast PC.

At the time, a Pentium II 450MHz processor was priced at well over $1,000 and I'd just scored its relative equivalent for around $300. The Celeron's 128K level 2 cache runs at the full speed of the processor, as opposed to the Pentium II's 512K level 2 cache, which runs at half speed, meaning the difference between them is negligible. In the first half of 1999, many people did this same trick, so you will often see benchmark results quoted on the Internet as from a 'Celeron 450'. That was never an official Celeron speed (there's a 433MHz and a 466MHz), so you can use this to gauge the prevalence of overclocking.

However, when the new PC was pushed hard while overclocked, it often crashed or suffered random reboots. The solution was to increase the CPU voltage in SoftMenu to 2.2V from the default 2.0V. To this day, over eight months later, this Celeron will not function adequately with less voltage, but it has not developed any other problems. Even after hours of use it remains warm, but never gets hot. It still uses the standard Intel heatsink and fan, though the fan is a little noisy, echoing against the metal. I may replace it with a more efficient one and try for 504MHz.

The 100MHz SDRAM crammed into the third DIMM slot — which is rumoured to make the BH6 more stable.

The final product, complete with masking tape.



Five empty PCI slots (the Pure 3D sat in the middle).

Catching up on PC housekeeping, I installed some important applications, including groupware, a browser and compression tools, then attached my Zip drive and scanner. The next day I noticed the screensaver was behaving erratically. It jerked violently every few seconds as if something was running in the background. I tried running a game and met with the same result, whether I used the Voodoo or i740 for 3D. Nothing other than my word processor and Lotus Notes seemed able to run without this hitching effect, even after I reinstalled everything.

After much unsuccessful poking and prodding, and removing and replacing of cards, I was sure there was something inherently wrong with my PC building skills. I thought that perhaps I'd damaged one of the components or bought incompatible parts. Eventually I decided the hand-me-down i740 was to blame. I had long-term plans to upgrade the video card, so I brought them forward and installed a 16M Leadtek WinFast3D S320, based on nVidia's Riva TNT chipset. Nothing much changed. Colours were more vivid and window operations were faster, but video, games and anything else that moved faster than a blinking cursor refused to run smoothly.

I tried removing the Voodoo card and its drivers, the soundcard and the TNT, but again nothing changed. What was worse, when I put the soundcard back it produced nothing but high-pitched feedback until I put it in the BH6's other ISA slot. A bit of newsgroup research informed me this was a known BH6 bug and PCI soundcards are a much better idea. I also learnt that many people were having trouble using TNT cards in a BH6 system.

Oh terrific! My PC was fast becoming a mess of incompatibilities and problems. This idea was reinforced when I tried a 3dfx Voodoo Banshee card instead. The PC wouldn't even boot, but thankfully *APC* Labs later confirmed the card was faulty.

One day I discovered a new version of my scanner driver was available. As an experiment I removed all traces of the old driver before upgrading. Lo and behold, all the graphics hitching stopped. It turned out that the scanner driver constantly checked for the presence of my aging Logitech PageScan, which I usually kept switched off, causing a little hiccup each time. So I transferred all scanning functions back to Beck, reinstalled Windows *again*, added the latest TNT driver and things looked great for 15 minutes.

Every time I ran a 3D game using the Riva TNT's OpenGL or Direct3D support,

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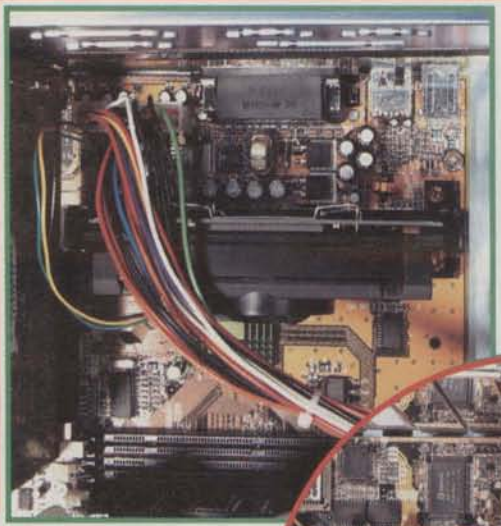
the screen froze 10 to 15 minutes later and I was forced to reboot. After a quick check on the Internet, I discovered this was symptomatic of the apparent conflict between the TNT and the BH6. Those who experienced this problem congregated in the motherboards forum at AnandTech (http://anandtech.com/), to report their crashes and answer questions from Abit engineer Oskar Wu, who was trying to beat the bug.

So great was the demand for a fix that Wu eventually released a beta BIOS, which I carefully installed, for the BH6. For many people, this became the solution, and shortly afterwards the beta became official (but not before a number of users had to replace their BIOS chips due to faulty flashing). However, my machine continued to crash and I had to reinstall the Voodoo card in order to run 3D games — a pretty embarrassing situation on a 450MHz machine! Running the Celeron at its default 300MHz didn't help either, and I made sure the AGP multiplier was two-thirds when at 100MHz bus speed. It was several months before I messed with the TNT again. Meanwhile I discovered that the front fan connector inside my PC case had ceased to function, which is reportedly another common BH6 bug. This meant I had to link the front fan to a standard Molex power connector, just like a disk drive.

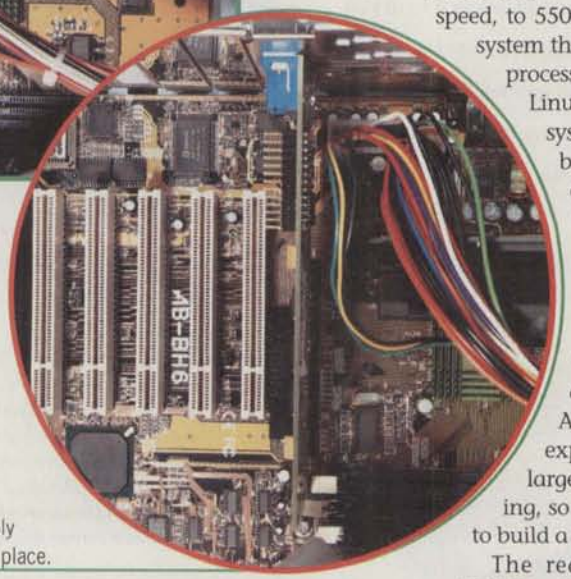
I'd heard about a TNT-overclocking program called MaxClock, which could also underclock, and decided to try that. After multiple reboots, I found that reducing the TNT's memory clock to 100MHz (from its default 110MHz) was the solution. No more crashes occurred until the day I installed EverQuest last July, which refused to run until I disabled MIDI on the AWE64 — these days very little music requires MIDI anyway. It continued to crash until I underclocked the TNT's processor to 83MHz (from its default 90MHz). The card may not be living up to its potential, but even at reduced clock speeds, it is still fast enough to give very high frame rates in most situations.

In the time I spent building my new system, I'm sure thousands of people have bought off-the-shelf PCs or games consoles and avoided all such woes. The money I saved by building my own machine did not compensate for the time I invested fixing Tale's problems, very few of which were due to errors on my part. If I charged myself for labour, the total cost of ownership would be astronomical!

Some would claim finetuning is all part of the fun when building a computer. I certainly learned a great deal about troubleshooting, which will help me in my job. However, it seems to me that far too many people go through this frustrating chain of events with a new PC, homemade or not. My new ideal system is an off-the-shelf console that can double as a PC (such as the Dreamcast or the upcoming PlayStation 2), but these machines have limitations. To make life simpler, I would have to sacrifice some of the things I want from a computer. The attraction of a full, custom-built PC is that it can be made to perform any function. Although I have sworn to save enough to buy my next machine from a reputable company, I may still do it all again.



The Celeron 300A runs happily at 450MHz, using its original fan and heatsink.



The ABit BH6's power supply connector is in an awkward place.

Thankfully I have been using Tale for several months now without any glitches (except for inexplicable variations in the quality of the S320's TV output). Beck is also humming along nicely and has reclaimed its Voodoo card. I would still like to link up the two machines so they can share a single Internet connection. A network kit is next on my shopping list, along with a TNT2 or Matrox G400 graphics card, a 3D soundcard, a cable modem, a 19in monitor, and more. If I ever actually buy these things, the K6-200 will receive more hand-me-downs. The Linux X Window System doesn't look very good on a 14in VGA monitor, so I will also be turning the Celeron 450MHz into a dual-boot machine.

Dream machine

If I were starting the project today, I would experiment with a dual-processor Celeron system. For example, Abit recently released a motherboard called the BP6 that supports dual Socket 370 processors, the current format for Celeron. The present overclocker's favourite is the Celeron 366MHz, which offers similar potential to the now-superseded 300A — often a 50% increase in speed, to 550MHz. Running an operating system that supports symmetric multiprocessing, such as Windows NT or Linux, on a dual 550MHz Celeron system would have to be the best bang for buck currently available. However, you will have to hurry as Celeron 366MHz manufacturing is due to cease shortly and a new overclocking favourite is not yet on the horizon. The fastest processor available appears to be the new AMD Athlon, but these were too expensive and not available in large numbers at the time of writing, so not ideal for someone trying to build a PC on the cheap.

The reason so many 300A and 366MHz Celerons are able to support such speeds is that they are manufactured using a more advanced process than their Pentium II cousins, which puts the level 2 cache on the chip itself, rather than in separate memory on the CPU card. They are still designed to run at the old 66MHz bus speed and are multiplier-locked. The 300A multiplies the bus speed by 4.5, and the 366MHz by 5.5. Introducing a 100MHz bus to these processors causes them to multiply that instead. Naturally, overclocking anything voids your warranty, so you must be willing to accept significant risks.

I would still choose 128M PC100 SDRAM. Too many systems these days ship with just 64M. As a gamer, I'd go for a hard disk bigger than 10G. It's hard to

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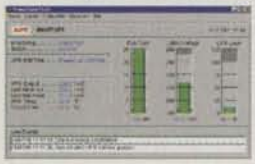

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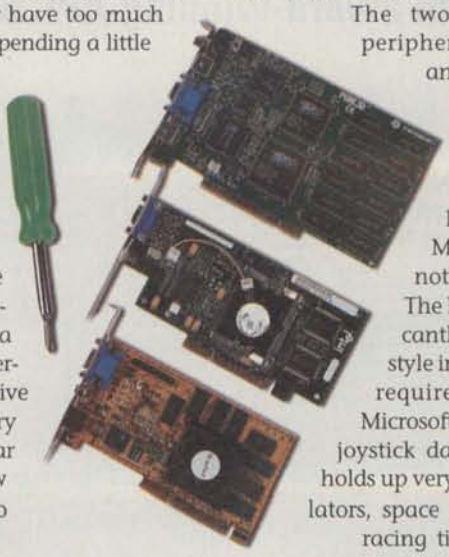
believe, but many new releases these days occupy 500M in a single installation.

As for graphics, I'd choose an nVidia Riva TNT2 Ultra card, preferably a Hercules Dynamite, which is about the fastest thing available. You can never have too much 3D speed and it's worth spending a little extra here. The alternative might be a Matrox G400MAX, which also shows great promise, or a Voodoo3 3000, which offers sheer grunt in the face of the others' prettiness. But if all of these were simply too expensive, I would stick with a standard TNT card, preferably a Diamond or Creative version due to their very good driver support. As far as I know, relatively few people have the need to underclock, and as card quality and motherboard compatibility have improved, the TNT is still the most competitive option behind the three new titans.



The three graphics cards used (top to bottom): Canopus Pure 3D, Intel i740 and LeadTek WinFast 3D S320.

For sound, I am torn between the Diamond Monster Sound MX300 and the Sound Blaster Live Value Edition. The Monster Sound has better 3D output, but the SB Live handles a little more 3D processing on the card itself, leaving more raw CPU power available for everything else.

The two most important peripheral components of any machine used for gaming are the mouse and joystick. A while ago, I bought a new Logitech MouseMan, and these days nothing can match it. The MouseMan is significantly better for Quake-style interfaces and doesn't require a mousepad. My Microsoft Sidewinder 3D Pro joystick dates from 1995, but holds up very well for flight simulators, space combat games and racing titles (though for the wealthy driving game fanatic, nothing beats a steering wheel and pedals).

Nothing makes a gamer's machine more atmospheric than the speakers. Having my PC connected to a full hi-fi system provides earth-shattering sound when I want it, although I often plug in a good pair of headphones when the neighbours need some sleep. The TV connection can be fun, but control is not very practical when your mouse and keyboard are attached to the PC by short leads. Infra-red or radio frequency connections are possible solutions, but a stable surface is still required, making console-style couch-potato gaming pretty difficult.

So that's the tale of Tale. But I still have one small admission to make. When I built Beck, one reader wrote to say that my use of Blu-Tack to attach a fan inside the case was disgracefully unnerdy. When I opened Tale's case the other day to make a list of the components for this article, I noticed that my power supply was still held in place by masking tape. Oh dear. Back in the dark days of 286es, every PC builder knew how to use a soldering iron. These days, everything is a matter of slotting things into place or tightening a couple of screws, which is much easier for a previously hardware-phobic journalist, but perhaps I'd better learn.■

Benchmark results

The machine was benchmarked using the existing installation of Windows 98; the video card was underclocked to 83MHz/100MHz. Each benchmark was run three times and the results were averaged to give a final score.

The benchmarks used were Ziff-Davis Winstone 99 and WinBench 99, as well as Futuremark's 3DMark 99 Max to measure games performance.

Business Winstone 99	21.9
CPUmark 99	37.3
FPU WinMark	2,463.3
Business Disk WinMark	2,806.7
High-End Disk WinMark	7,166.7
Business Graphics WinMark	151.3
High-End Graphics WinMark	503.3
3DMark 99 Max	3,783.0

These results put the system at the high end of results reported on the Web for new Celeron 466MHz and Pentium II 450MHz systems (the closest match to the system described here). As a comparison, *APC* Labs' tests of new Pentium III systems between 450MHz and 550MHz resulted in Business Winstone results ranging from 20.2 to 25.4. Such comparisons make it hard to justify the price difference between Celeron and Pentium II or III CPUs, and when you consider that Celeron 300A systems overclocked to 450MHz have been around since late 1998, Intel's current CPU speeds do not seem to have advanced fast enough.

It is worth noting that the disk WinMark results varied dramatically — from 2,330 to 3,220 for the business disk WinMark, and from 6,830 to 8,060 for the high-end disk WinMark.

The Winstone and WinBench tests were performed without independent verification by Ziff-Davis, and Ziff-Davis makes no representation or warranties as to the results. Winstone and WinBench are registered trademarks of the Ziff-Davis Publishing Company. 3DMark is a registered trademark of Futuremark Corporation.

Home cooking

Building your own PC gives you the freedom to choose the parts you want, allocating available funds to whichever components you feel are most important. Often, parts such as a floppy disk drive, a keyboard, a mouse and even the monitor can be sourced from older machines to save money.

Here is a list of the components used to build Tale:

- SuperMicro mid-tower ATX case
- 250W power supply
- Abit BH6 motherboard (BIOS version KG)
- Celeron 450MHz (300A on 100MHz bus)
- 128M Mitsubishi PC100 SDRAM
- Leadtek WinFast 3D S320 nVidia Riva TNT 16M (Detonator driver v1.8)
- Quantum Fireball SE 8.4G Ultra/ATA
- Sound Blaster AWE64 Value Edition
- 32x Mitsubishi Diamond Data CD-ROM drive
- 3.5in floppy disk drive (from old 486)
- Honeywell keyboard (from old 486)
- Tandy 12V front case fan
- Logitech four-button MouseMan
- 15in Osborne (Philips) SVGA monitor (from old Pentium)
- Windows 98 (with DirectX 6.1)

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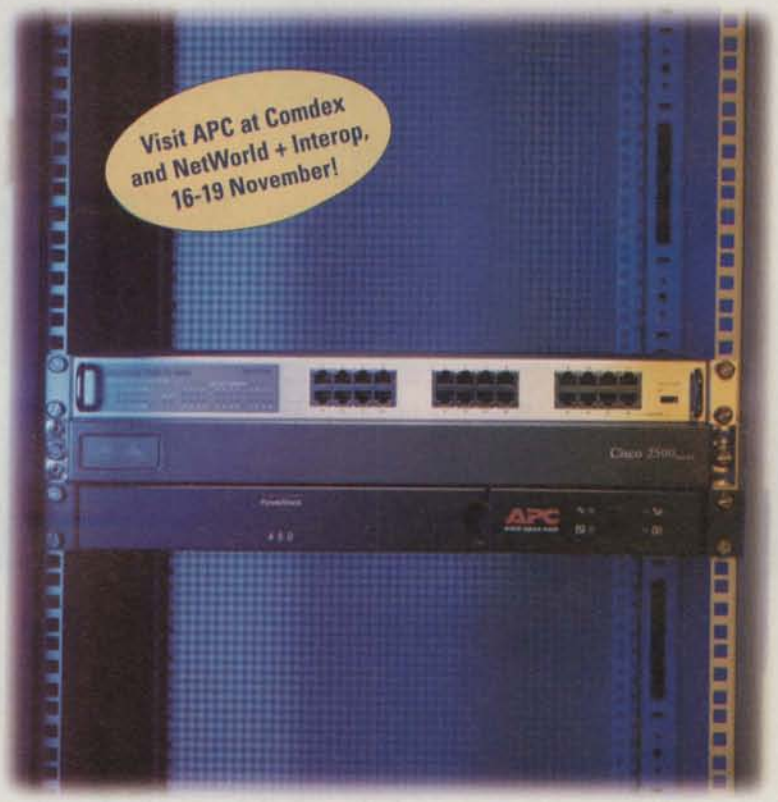

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DRIVES

All too often a computer's hard drive is judged more on its capacity than its actual performance. How often have you seen a PC advertised with the hard drive's capacity, but no mention of the brand or performance? That's what makes the benchmarks used by *APC* Labs so important: they check a computer's subsystems and give you a detailed summary of each one's performance. This month, the latest hard drives on the market are put through their paces. **By Darren Ellis**

on a platter

APC invited vendors to submit a hard drive for each of four categories: drives under $300, drives over 10G, mega-capacity drives and SCSI drives. Specifications for each category were simple. Both drives under $300 and drives over 10G had to be ATA drives. The SCSI drives had to be Ultra2 SCSI, while the mega-capacity drives could be either SCSI or ATA.

We didn't receive any Ultra ATA/33 drives; they were all Ultra2 SCSI or Ultra ATA/66. The Ultra ATA/66 interface has only been around for a few months, but it has already taken off. It is the latest and one of the most important improvements to the ATA (or IDE) interface. Ultra ATA/33 was only capable of burst transfer rates of 33M per second, and in theory Ultra ATA/66 is capable of double that.

There were significant increases in performance in the Ziff-Davis Business Disk WinMark 99 when we tested at ATA/66 over ATA/33, but in our other tests the performance increase was negligible. If you want to take advantage of these drives, then a motherboard upgrade may be in order. If your motherboard does not support Ultra ATA/66 connections, don't despair; Ultra ATA/66 drives still work fine on Ultra ATA/33 connections, but at the slower speed.

The rift between SCSI and IDE has not healed and won't heal until IDE can equal or even come near the performance of SCSI. Both have their pros and cons. In a nutshell, SCSI is faster and less CPU-intensive than IDE, but more expensive.

Unlike IDE drives, which can have up to two devices on a cable, SCSI can handle up to seven (or 15 depending on the controller) devices simultaneously. IDE is only capable of reading one channel at a time, resulting in wait times between drives. However, some Ultra2 SCSI controllers can read two channels simultaneously for a maximum throughput of 160M a second or 80M a second for each drive.

Most of the IDE data is channelled through the processor, which is why your system bogs down when reading/writing extensively to your drive. On the other hand, SCSI uses a DMA interface that frees up the processor considerably (by about 40% to 50%, according to the test results).

Typically, a SCSI drive has a larger capacity than an IDE drive, faster spindle speeds and better performance, but it cannot match IDE's low cost for a similar capacity. An IDE drive is much easier to install, as SCSI sometimes requires drive terminations such as those on a local bus network.

How we tested

The drives were tested on a Beyond SuperO Professional 500MHz Celeron running Windows 98 with 64M of SDRAM on a motherboard based on the Intel 810 chipset, which fully supports Ultra ATA/66 drives.

Each drive was formatted in FAT32 before testing. For the SCSI drives, we used Adaptec's 3950U2B SCSI add-on card.

We ran the Disk WinMark portion of Ziff-Davis' **WinBench 99** test suite. This is broken into two distinct tests: the **Business Disk WinMark 99** and **High-End Disk WinMark** tests. Both benchmark tests measure the performance of the machine's disk subsystem as it performs various tasks in a Windows environment.

The second test was with **ThreadMark 2.0**. This is a 32-bit application that performs read and write operations on the hard disk using standard Win32API commands. ThreadMark performs an extensive set of disk drive tests to calculate the drive's data transfer rate and the load these tests place on the processor.

All products used in these tests are shipping versions available to the public at the time of publication, unless otherwise stated. Winstone, WinBench and associated programs are registered trademarks of Ziff-Davis Inc. These tests were performed without independent verification by Ziff-Davis, and Ziff-Davis makes no representations as to the results.

Due to technical problems, we were unable to test the two IBM drives submitted to us for review in this feature. Our apologies to IBM.

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Hard drives under $300

Editor's Choice
Maxtor DiamondMax 6800

Maxtor DiamondMax 6800

The DiamondMax 6800 is by far the cheapest hard drive out of the three sub-$300 units, and its higher-than-normal capacity keeps the price per gigabyte down, making it a reasonable purchase. It is $50 cheaper than the nearest-priced drive, and you net an extra 1.8G capacity.

The three drives in this category all use the Ultra ATA/66 interface, and have spindle speeds of 5,400rpm.The performance of the DiamondMax 6800 could not be matched by the other two disks, running over one-and-a-half times faster in the Business Disk WinMark 99. It also led in the High-End Disk WinMark 99, although not by as much.

In ThreadMark 2.0 it trailed, with a transfer rate over half a megabyte less than the other two models, but its CPU load was average — well below than the Quantum Fireball CR but above the Seagate by the same margin. After considering its cheap pricing, high capacity and reasonable performance, *APC* awarded the DiamondMax 6800 the Editor's Choice for this category.

Quantum Fireball CR

The Fireball CR is the most expensive model in the sub-$300 category, costing about $10 more than the same size Seagate ST38421A. The Fireball CR was the better performer of these two drives.

Even though it was faster than the Seagate, it was unable to catch the Maxtor DiamondMax 6800 in the Ziff-Davis hard drive tests. In the Business Disk WinMark 99, it came in at more than half the score of the DiamondMax 6800 and just over the Seagate ST38421A. It did better in the High-End WinMark 99 test, increasing its lead over the Seagate and inching closer to the Maxtor.

A distinct improvement was shown in the ThreadMark 2.0 tests. Its throughput results were higher than the other drives, although it placed more of an overhead on the processor when doing so.

Seagate ST38421A

It is easy to compare the Seagate ST38421A with the Quantum Fireball CR, as they both have 8.4G capacity and similar pricing. In ThreadMark 2.0, it rated a decent 4.17M a second transfer rate, beating some of the drives in the other categories with spindle rates faster than 5,400rpm, but not enough to oust the Fireball CR from the top spot. Its CPU usage was very low though, taking only 75% of the load.

The Seagate ST38421A could not cut the mustard in the Ziff-Davis tests. It was just behind the Quantum Fireball CR in the Business Disk WinMark 99, but well behind both in the High-End WinMark 99 tests.

The drive is still cheap for its price; it's $10 less than the Fireball CR but $50 more than the DiamondMax 6800. The Diamond Max also has a larger capacity and performs better. At this price and performance, the ST38421A is a good buy, but not the best.

Hard drives under $300: Specifications and results

Product	Maxtor DiamondMax 6800	Quantum Fireball CR	Seagate ST38421A
Distributor	Maxtor	Ingram Micro	Seagate
Phone	(02) 2369 3662	(02) 9736 3688	(02) 9725 3366
Online	http://www.maxtor.com/	http://www.quantum.com/	http://www.seagate.com/
Price	$220	$281	$270
Warranty	3 years	3 years	3 years
Hard disk drive size	10.2G	8.4G	8.4G
Price per gigabyte	$21.56	$33.45	$32.24
Hard disk drive type	Ultra ATA/66	Ultra ATA/66	Ultra ATA/66
Drive speed (rpm)	5,400	5,400	5,400
Average seek time (M per second)	9	9.5	10.5
Internal data transfer rate (M per second)	27.80	24.25	25.75
Business Disk WinMark 99 (K per second)	3,670	2,360	2,110
High-End Disk WinMark 99 (K per second)	6,990	6,330	5,500
ThreadMark 2.0 data transfer rate (M per second)	3.49	4.21	4.17
ThreadMark 2.0 average CPU utilisation	81.70%	86.45%	75.38%

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Hard drives over 10G

Editor's Choice
Quantum Fireball Plus KA

Quantum Fireball Plus KA

This drive is the cheapest in this category, but it also has the smallest capacity. Its price per gigabyte is low but the Seagate Barracuda ATA 28, which has double the capacity, is even cheaper. In spite of this, we awarded this drive the Editor's Choice, because you'll save about $200 and still get a great drive.

Its test results were good. In fact it achieved the highest score of any of the 7,200rpm Ultra ATA/66 drives in the High-End Disk WinMark 99 and more than double what the Western Digital Expert 18G scored.

All three drives here were remarkably similar in the ThreadMark 2.0 tests, scoring near-identical results for both throughput and processor use. As it is though, the Fireball Plus KA rated a slower throughput than the other drives, but it placed slightly less strain on the processor.

Seagate Barracuda ATA 28

Another new drive from Seagate, the Barracuda ATA 28 is large enough to match some of the drives in the mega-capacity category, but we are reviewing it here because the Barracuda 50 is being reviewed there.

It's one of the cheaper drives per gigabyte, coming in at only $23.09, but in this category it cost over $200 more than the Quantum and $50 more than the Western Digital. This price discrepancy is due to the Barracuda ATA 28's larger size. It has twice the capacity of the Quantum Fireball Plus KA and has 10G more than the Western Digital Expert, which makes it worthwhile if you can afford the higher price.

It performed well in the test suite. It surpassed both of the other drives in the Business Disk WinMark 99 and was double the speed of the Western Digital Expert in the High-End WinMark 99, although not quite as fast as the Quantum Fireball Plus KA.

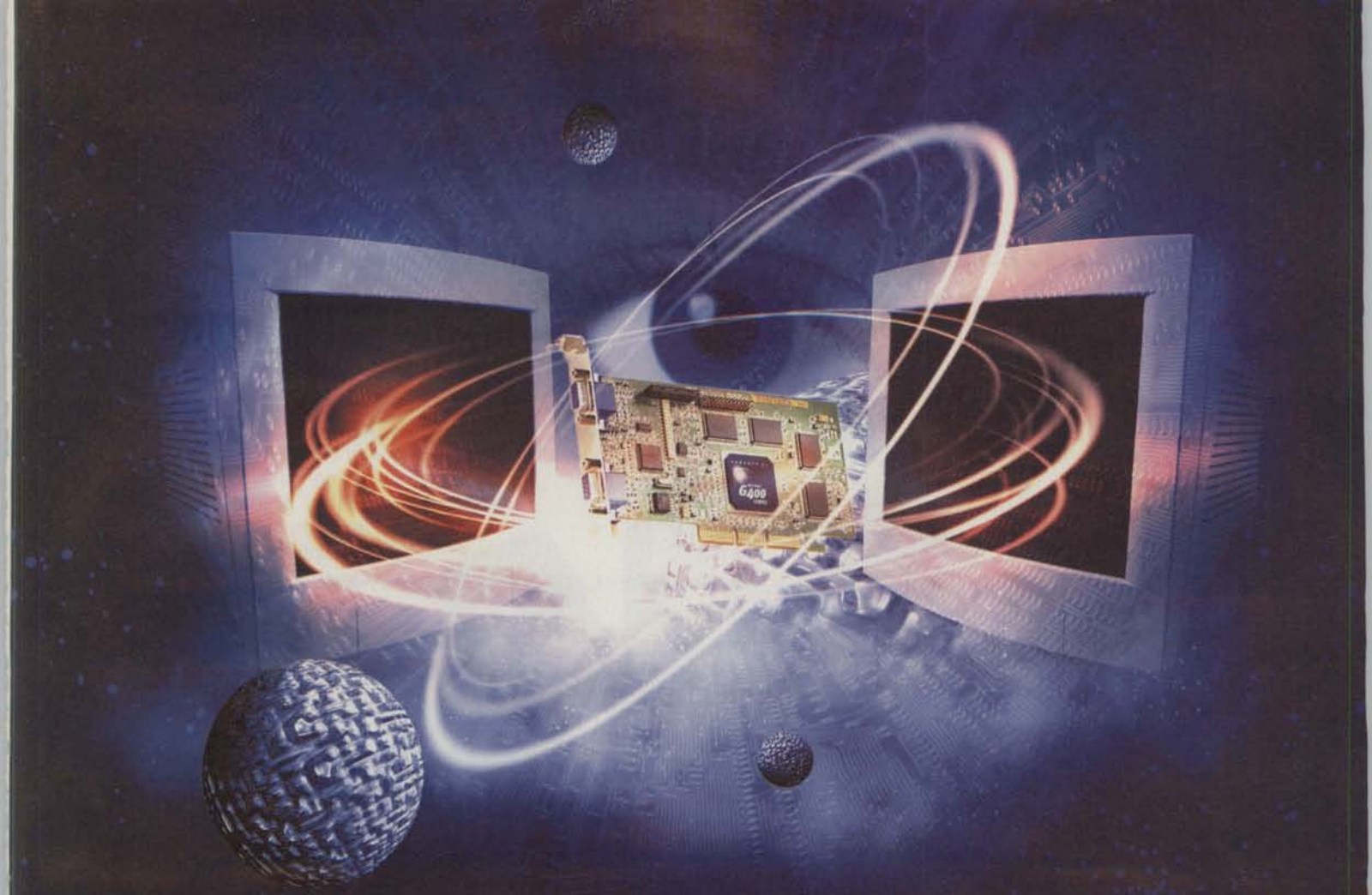
Western Digital Expert 18G

A bit slower than the other drives, the Western Digital Expert 18G came last in both Ziff-Davis tests. It was only marginally slower in the Business Disk WinMark 99 but considerably behind the others in the High-End Disk WinMark 99, coming in well under half the speed of the others. Its score was surprisingly low for a 7,200rpm drive, but it performed better in ThreadMark 2.0. It had the fastest throughput with an average CPU load, but it wasn't a winner by much.

It's price is also a little steep, especially when compared with the other drives. The Quantum Fireball Plus KA is smaller and has better performance at a far cheaper price, and the Seagate Barracuda ATA 28 costs slightly more but offers a bigger capacity and better performance. In terms of value for money, you should be looking at either of those drives.

Hard drives over 10G: Specifications and results

Product	Quantum Fireball Plus KA	Seagate Barracuda ATA 28	Western Digital Expert 18G
Distributor	Ingram Micro	Seagate	Westan
Phone	(02) 9736 3688	(02) 9725 3366	(03) 9543 7733
Online	http://www.quantum.com/	http://www.seagate.com/	http://www.westerndigital.com/
Price	$413	$646	$590
Warranty	3 years	3 years	3 years
Hard disk drive size	13.6G	28G	18G
Price per gigabyte	$30.36	$23.09	$32.77
Hard disk drive type	Ultra ATA/66	Ultra ATA/66	Ultra ATA/66
Drive speed (rpm)	7,200	7,200	7,200
Average seek time (M per second)	8.5	8.6	9
Internal data transfer rate (M per second)	29.37	40.37	28
Business Disk WinMark 99 (K per second)	2,840	3,150	2,640
High-End Disk WinMark 99 (K per second)	7,220	6,900	2,960
ThreadMark 2.0 data transfer rate (M per second)	3.06	3.09	3.19
ThreadMark 2.0 average CPU utilisation	72.98%	76.43%	74.99%



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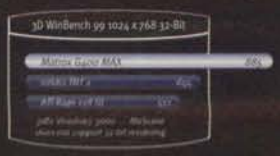

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Mega-capacity hard drives

Editor's Choice
Seagate Barracuda 50

Maxtor DiamondMax Plus 6800

When you compare this drive with the other 7,200rpm drives in the 'over 10G category', you can see that it has performed very well in all the tests. However, ranked against the other drives in this category, it didn't fare so well.

The slower Western Digital Caviar drive beat this model in all tests, which is surprising when you consider that the DiamondMax 6800 did so well. It was marginally slower than the Caviar in the Business Disk WinMark 99, but the difference was greater in the High-End WinMark 99 tests.

The DiamondMax Plus 6800 is competitively priced and its cost per gigabyte is almost identical to the smaller Western Digital Caviar.

Quantum Atlas IV

This drive was able to outperform the other SCSI drive in this category, the Seagate Barracuda 50, in every regard. It is less than half the price of the Barracuda, but also less than half the capacity. The cost is higher by almost $20 a gigabyte, which is quite a margin.

Once tested, the Atlas IV was faster and better, and even a contender in the SCSI drive category. All up, we couldn't really fault this drive aside from its price.

Seagate Barracuda 50

This is one of the latest drives to come from the Seagate factory. It offers a huge capacity at a decent price. Aside from the Quantum Atlas IV, this is the only other Ultra2 SCSI drive in this category. In comparison with the other two drives in this category that aren't SCSI drives — and across all the SCSI drives we tested apart from the other Seagate — the Barracuda 50 is the underachiever. This is not remarkable, as all the SCSI drives were 10,000rpm and these two are only 7,200rpm.

It was easy on the CPU in ThreadMark 2.0 but its throughput was low. The Business Disk WinMark 99 score was comparable to the Ultra ATA/66 drive scores, but the High-End Disk WinMark 99 score proves the power of SCSI.

For a SCSI drive, the Barracuda 50 is very economical — it's almost half the price per gigabyte of other SCSI drive brands. If you can afford the high price, you'll have a monster drive.

Western Digital Caviar WD205AA

Although the spindle rate for this drive was slower than all of the others in this category, it still scored rather well in all of our tests. It did very well against the other 5,400rpm drives from the sub-$300 category.

It outdid the DiamondMax 6800 Plus in both Ziff-Davis tests, and although it took almost 95% of the CPU's resources it still had a high throughput. This is a low-cost, large-capacity drive.

Mega-capacity hard drives: Specifications and results

Product	Maxtor DiamondMax Plus 6800	Quantum Atlas IV	Seagate Barracuda 50	Western Digital Caviar WD205AA
Distributor	Edge Technology	Ingram Micro	Seagate	Westan
Phone	(02) 9353 9200	(02) 9736 3688	(02) 9725 3366	(03) 9543 7733
Online	http://www.maxtor.com/	http://www.quantum.com/	http://www.seagate.com/	http://www.westerndigital.com/
Price	$750	$1,433	$3,025	$550
Warranty	3 years	5 years	5 years	3 years
Hard disk drive size	27.3G	18.2G	50.1G	20G
Price per gigabyte	$27.57	$78.73	$60.39	$27.50
Hard disk drive type	Ultra ATA/66	Ultra2 SCSI	Ultra2 SCSI	Ultra ATA/66
Drive speed (rpm)	7,200	7,200	7,200	5,400
Average seek time (M per second)	9	6.9	7.4	9.5
Internal data transfer rate (M per second)	33.7	32.1	26	29.1
Business Disk WinMark 99 (K per second)	2,810	4,090	3,520	3,370
High-End Disk WinMark 99 (K per second)	6,480	13,100	12,000	7,070
ThreadMark 2.0 data transfer rate (M per second)	3.77	16.19	14.98	4.04
ThreadMark 2.0 average CPU utilisation	89.09%	46.37%	42.62%	94.2%

"It was awesome.
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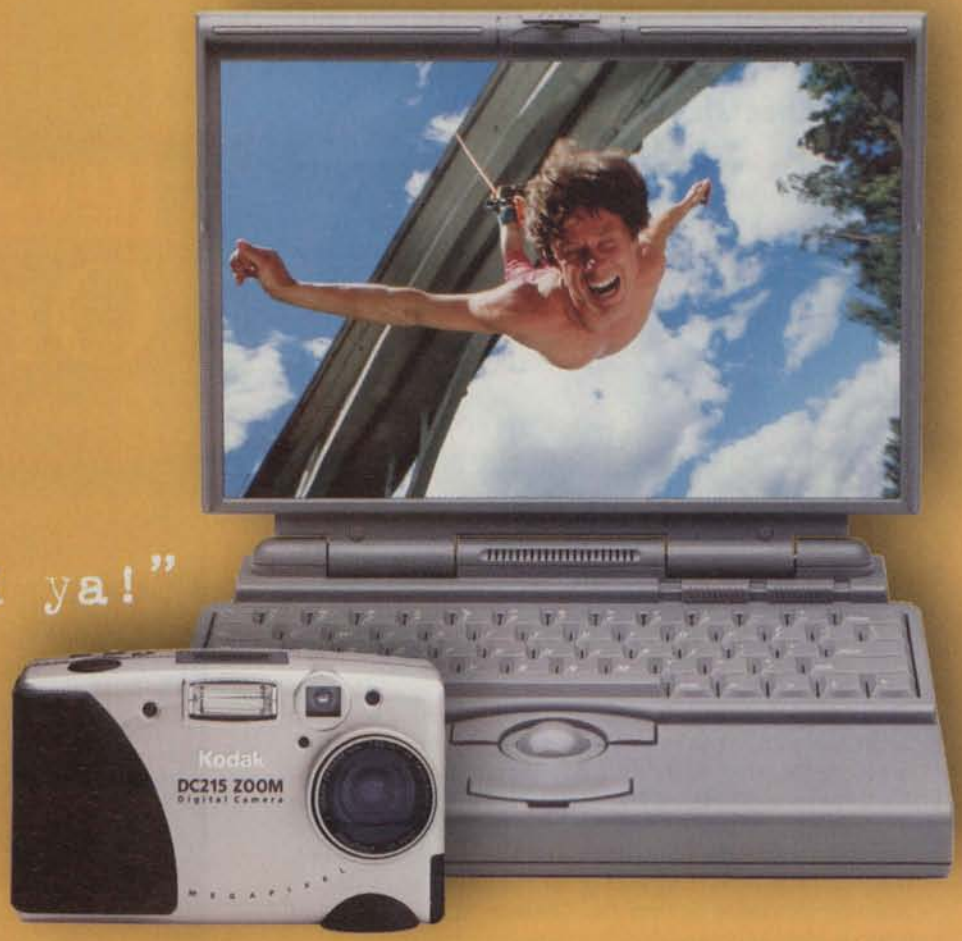

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SCSI drives

Quantum Atlas 10K

Easily the fastest and most robust of the three SCSI drives in this category, the Quantum Atlas 10K was able to outrun the others in every case, including a slightly heavier use of the processor during the ThreadMark 2.0 test. It churned out a hefty 20M-plus throughput in the same test, over twice that of the Seagate Cheetah 9LP.

It was a firm leader in the Ziff-Davis tests, achieving the highest scores out of all the drives in this feature for both benchmarks. Its whopping score of 16,100 in the High-End Disk WinMark 99 was over 2,000 points more than the closest competitor, the Western Digital Enterprise. The Business Disk WinMark 99 returned a similar result; it led the pack but was closely followed by the Western Digital Enterprise.

Not only is it a strong performer, it is also reasonably priced. It's $130 cheaper than the Western Digital Enterprise, which has the same capacity. Its price per gigabyte is well below the Seagate Cheetah 9LP. For stunning performance at a great price, you can't look past this drive.

Seagate Cheetah 9LP (ST39102LC)

A few SCSI drives were submitted for review, but only three were appropriate for this particular category. Of these, the Cheetah 9LP was the smallest, offering less than half the capacity of the other two drives. The spindle speeds are almost identical and the seek times are comparable, but the Cheetah fell behind the other two in our tests.

Data transfer rates when running ThreadMark 2.0 were two to three times that of an Ultra ATA/66 drive, but almost half that achieved by the other SCSI drives. Similar results were recorded in the Ziff-Davis disk tests. The disk actually scored less than some Ultra ATA/66 drives in the Business Disk WinMark 99. Its performance was better in the High-End Disk WinMark 99 test, but the score was about half that of the Quantum Atlas 10K.

Another downside is that the Cheetah 9LP is somewhat expensive, especially considering its smaller capacity.

Western Digital Enterprise WDE18300-0049

If it wasn't for the Quantum Atlas 10K and its remarkable performance, the Western Digital Enterprise WDE18300-0049 would be the sure-fire winner in this category. The Enterprise WDE18300-0049 is the second-fastest SCSI drive out of these three, and the second fastest across every other category in the Ziff-Davis disk tests. Its ThreadMark 2.0 throughput of 17.82M

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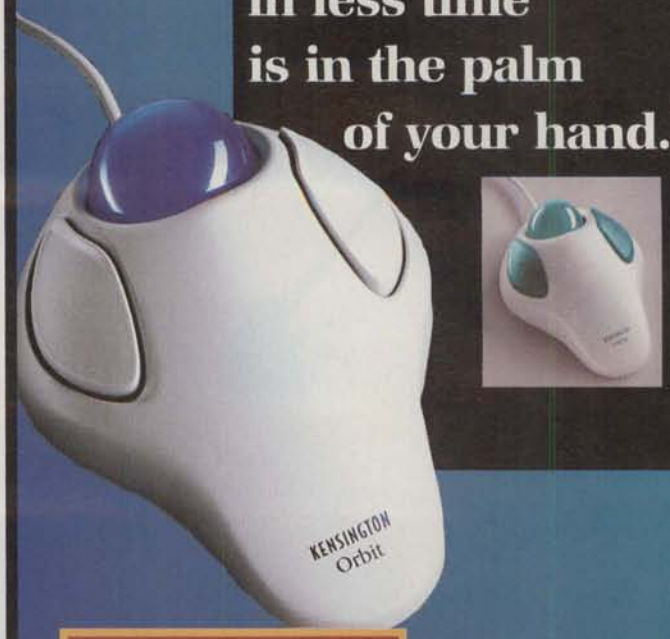

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was also second to the Quantum Atlas 10K, but it used less CPU capacity.

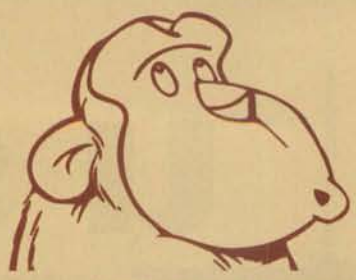
Regardless of its impressive scores in the High-End Disk WinMark 99 test, it was still slower than the Atlas 10K by a margin of 2,100 points. This is a big difference, but nothing like the gap between this drive and the Seagate Cheetah 9LP.

This drive is priced just below $2,000. It has the same capacity as the Atlas 10K, but cost slightly more per gigabyte. This is a great hard drive, but is edged out by the Atlas 10K in almost every regard. If you can't get your hands on an Atlas 10K, check this one out.

Editor's Choice
Quantum Atlas 10K

SCSI drives: Specifications and results

Product	Quantum Atlas 10K	Seagate Cheetah 9LP (ST39102LC)	Western Digital Enterprise WDE18300-0049
Distributor	Ingram Micro	Seagate	Westan
Phone	(02) 9736 3688	(02) 9725 3366	(03) 9543 7733
Online	http://www.quantum.com/	http://www.seagate.com/	http://www.westerndigital.com
Price	$1,865	$1,122	$1,995
Warranty	5 years	5 years	5 years
Hard disk drive size	18.3G	9.1G	18.3G
Price per gigabyte	$101.91	$123.34	$109
Hard disk drive type	Ultra2 SCSI	Ultra2 SCSI	Ultra2 SCSI
Drive speed (rpm)	10,000	10,000	10,000
Average seek time (M per second)	5	5.2	6.9
Internal data transfer rate (M per second)	39.37	28.87	30.00
Business Disk WinMark 99 (K per second)	4,800	2,850	4,130
High-End Disk WinMark 99 (K per second)	16,100	8,630	14,000
ThreadMark 2.0 data transfer rate (M per second)	20.24	9.62	17.82
ThreadMark 2.0 average CPU utilisation	55.64%	54.80%	48.53%



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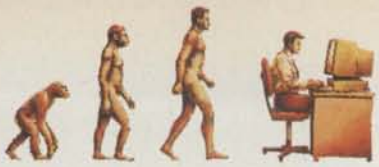

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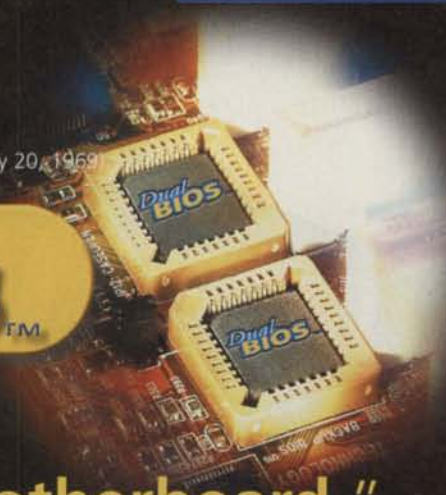

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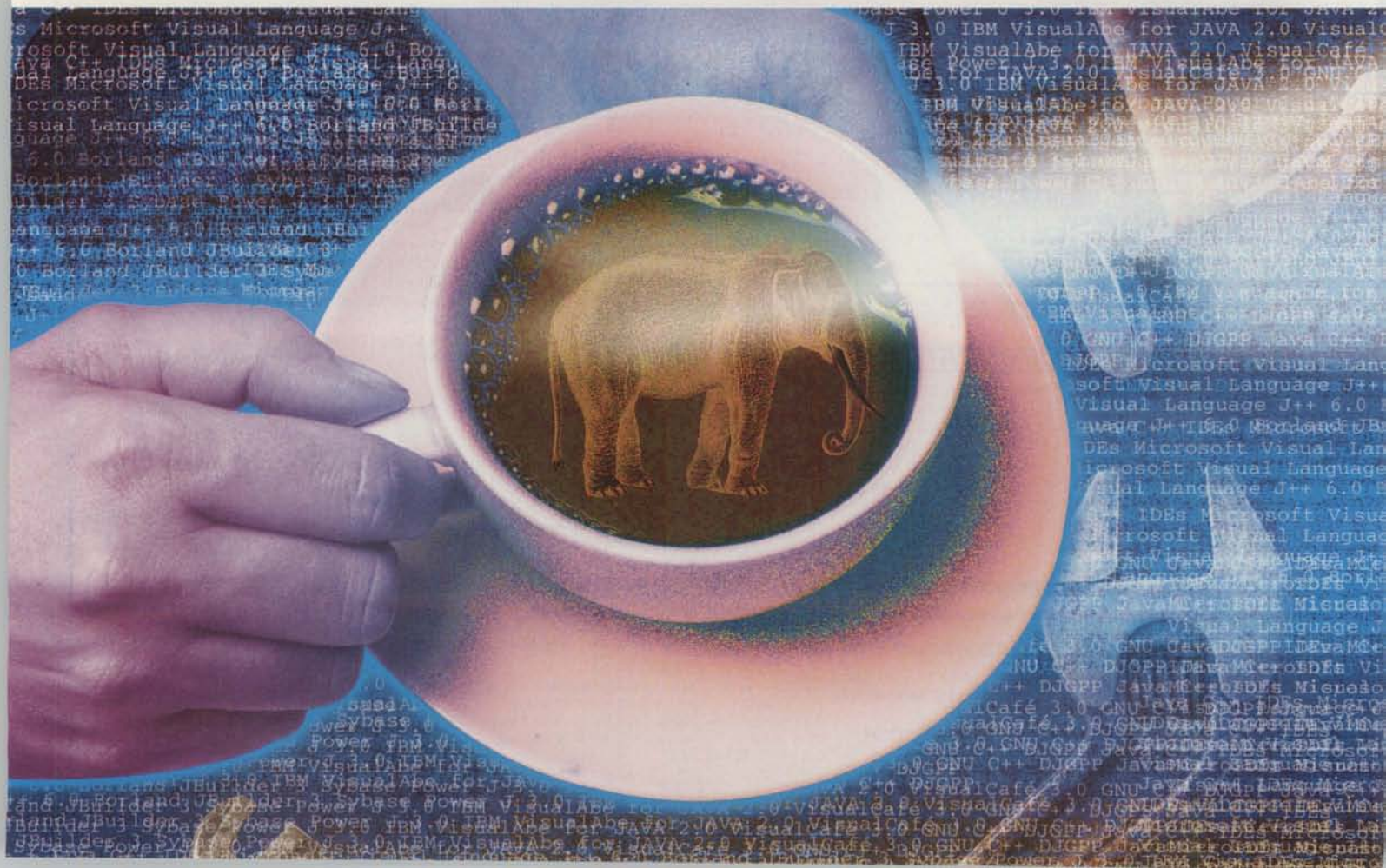
TOOL TIME



If you're a developer, the right choice of tool can mean the difference between the timely completion of a high-performance application and the late delivery of a slow, buggy one. *APC* this month puts some development environments for C++ and Java developers under the microscope. **By Michael Smith**

In the classic Disney movie *Fantasia*, there is a delightful scene in which a herd of elephants, clad in frilly tutus, perform the 'Dance of the Sugar Plum Fairy'. As work progressed on this review, this image repeatedly came to mind. In the software development jungle, Java and C++ IDEs are the elephants. They lack the grace and speed of the gazelle or the beauty of the zebra. However, if you have to move a really big boulder, grace and beauty won't help, you need heavy-duty muscle. You need an elephant.

In this review, we test five Java IDEs: Microsoft's Visual J++ 6.0, Inprise's Borland JBuilder 3, Sybase's PowerJ 3.0, IBM's VisualAge for Java 2.0 and Symantec's VisualCafé 3.0. This is not an exhaustive list, but a selection of the most popular Java tools.

We also examine two C++ IDEs, Borland C++ Builder 4.0 and Microsoft Visual C++, and DJ Delorie's Windows port of the GNU C++ compiler, known as DJGPP.

It's probably a good time to explain what an IDE is. I first heard the term IDE (Integrated Development Environment) in the mid 1980s, when Borland used it to describe its Turbo C and Turbo Pascal environments. The IDE consisted of a full-screen editor, a compiler and a debugger. At the time this was a big step forward. Things have, of course, progressed since then. Windows developers in particular have come to expect much more from their IDEs. A significant number of Unix developers (except SGI programmers) still use vi1 and Emacs2, and Mac developers have probably been using graphical tools since the Turbo C IDE was in its infancy.

Today, developers generally expect the following tools:

A component palette A toolbar containing icons which represent various components such as buttons, text fields, images and tables which can be used in the program.

A form designer A graphical editor that allows components to be dropped onto a form or dialog and moved around to fine-tune the interface.

A property sheet A dialog to display the properties of components and allow you to edit those properties.

A code generator An engine to generate code (Java, C++ and so on) to implement forms.

Of course, you would still expect a text editor, a compiler and a debugger, but now you would expect them to be much better integrated.

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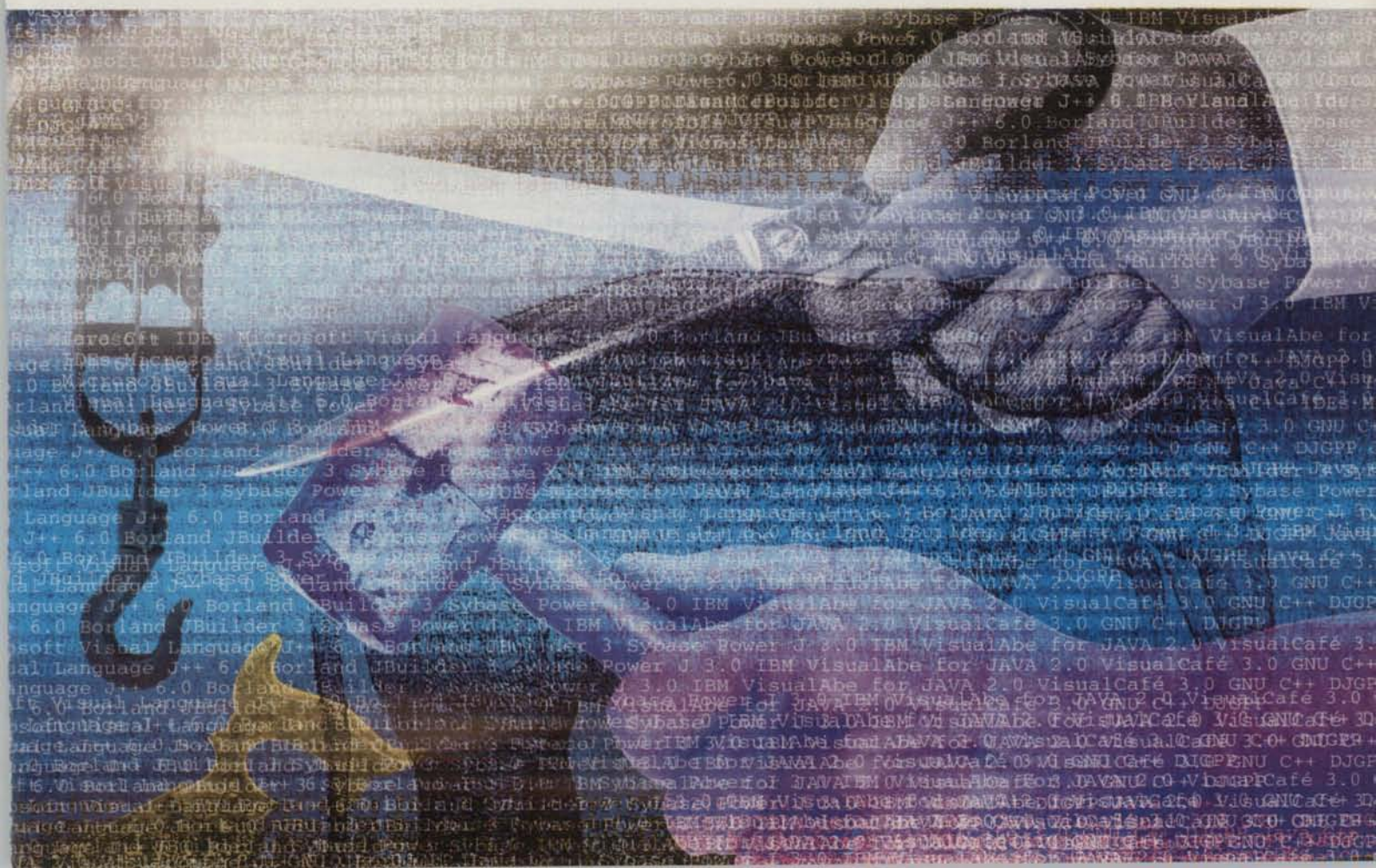

Java benchmarks

APC ran Mark Roulo's Java benchmarks under each of the Java IDEs to test their performance. (See http://www.javaworld.com/javaworld/jw-09-1998/jw-09-speed.html for more info on the benchmarks.) Unfortunately, we were unable to get the benchmark software to run with the Sybase compiler. The benchmark was also run under Netscape Navigator 4.5 to provide additional comparison.

Mark's software tests some low-level performance characteristics of each of the IDEs. There are a few points to consider when interpreting the data. First, the tests measure very small numbers, and therefore are very susceptible to errors. If the disk cache decides to flush and steal a few CPU cycles, a reading can be skewed quite badly. Therefore, it is important to focus on larger trends rather than individual readings.

The numbers have also been scaled, because they are very small. For each test, a mean was computed and the result for each IDE presented as a percentage of the mean. A result of 100% means that the score is equal to the mean, less than 100% means it performed faster than average,

while a result greater than 100% means it was slower than average. This tends to exaggerate differences. The exaggeration is useful to determine relative rankings, but not to determine the magnitude of the differences (the rankings of the IDEs are significant, but the magnitude of separation is less significant).

C++ benchmarks

To give a quick performance indication for the C++ IDEs, *APC* ran a short test program (see BMARK.CPP on disc 1 of **apcmag.cd** under 'Java and C++ development tools'). The program read in a series of text strings, stored them in an STL list, sorted the list and then wrote out the results. It's a simple program that only tests a small subset of the functionality of these IDEs. The results are not a definitive measure of compiler quality, but they do make interesting reading.

The GNU compiler had the fastest compile time. It's a smaller, leaner tool than the others. Surprisingly, the Borland compiler took around half the time of the Microsoft compiler.

The runtimes of the Borland version of the benchmark were awful. Although it's not a definitive test, Borland engineers should feel nervous. It was interesting to see the GNU compiler almost match the Microsoft one.

The three C++ tools we looked at were all outstanding in different ways. The GNU compiler stacks up quite well as an ANSI/ISO C++ compiler with associated tools. The fact that it's free makes it a perfect tool for developing portable (non-Windows) applications. It's also a great teaching tool, because even students can afford it. The Borland compiler is a full-featured client/server development system. Its dual COM/CORBA support makes it the best choice for enterprise development. For development where CORBA support is not required, the speed and ease of use of the Microsoft compiler makes it hard to beat.

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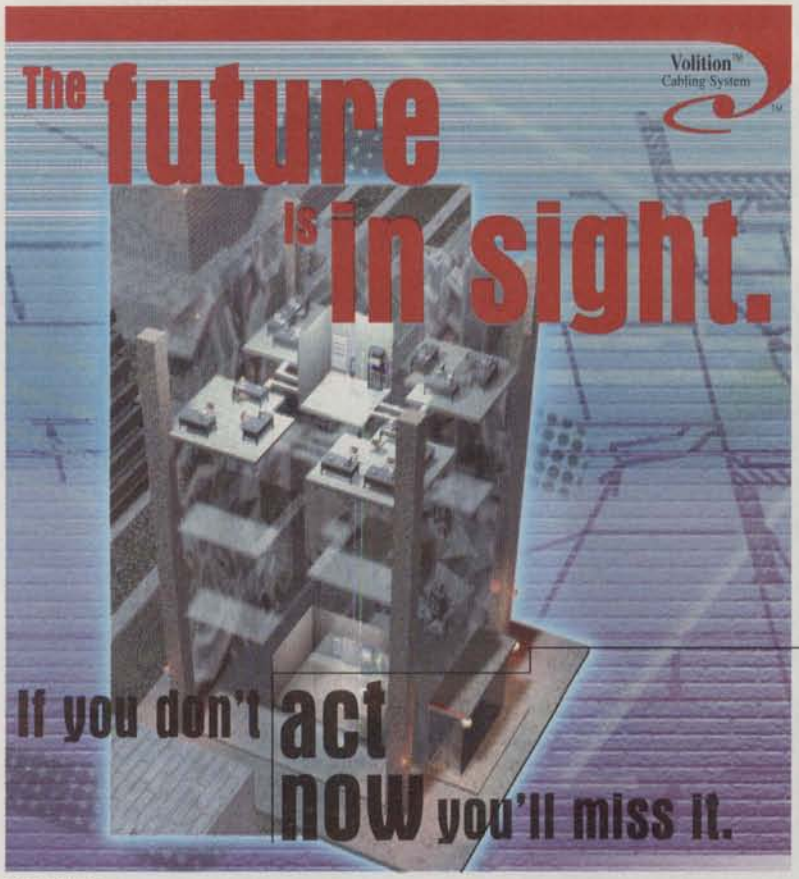

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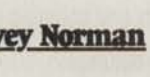

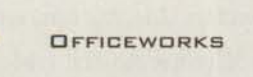

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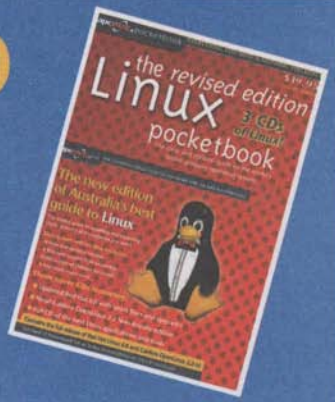

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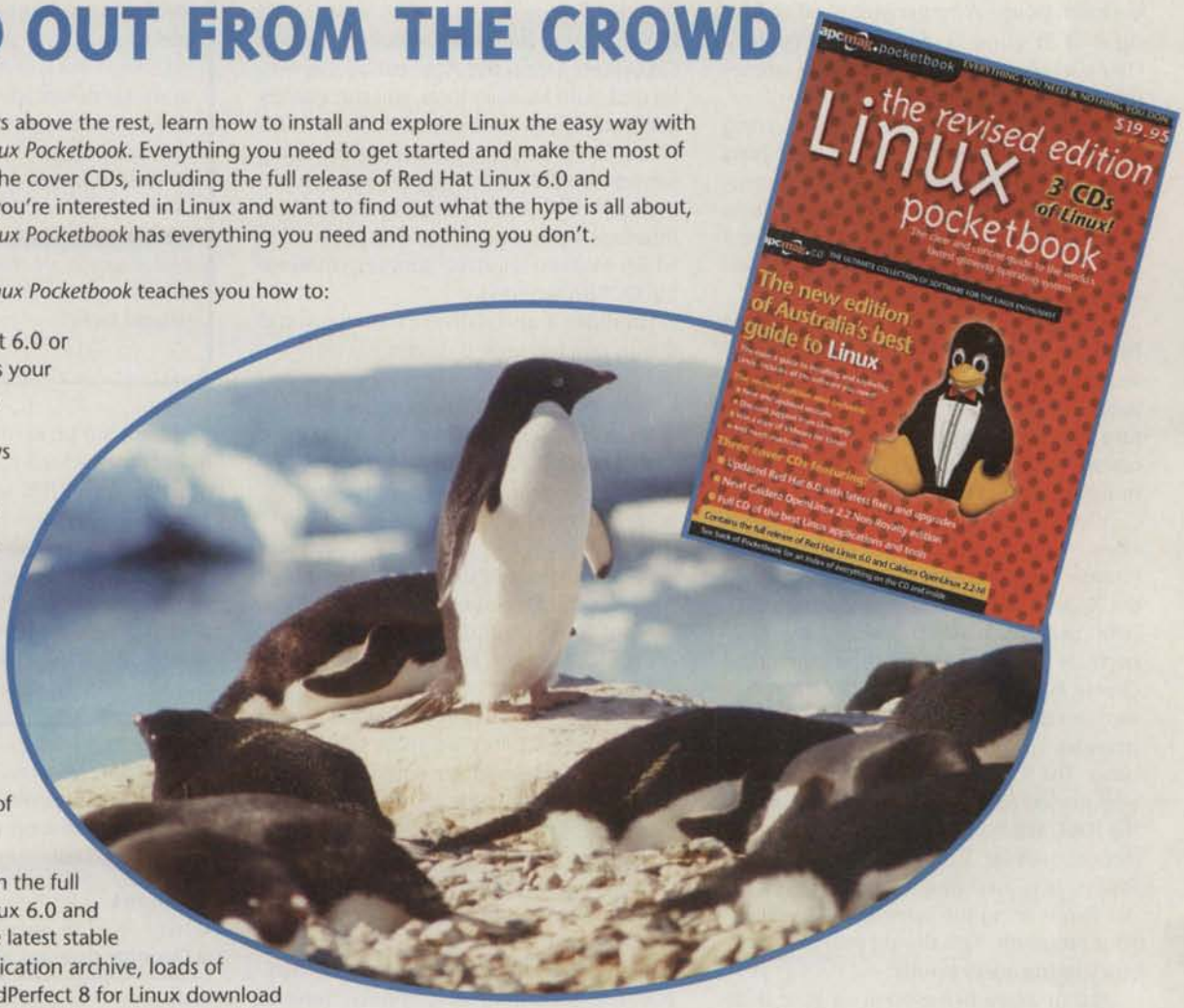

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Java development tools

Borland JBuilder 3

This is a serious Java tool from Inprise's Borland group. Whether you need to jazz up a Web page or develop heavy-duty client/server apps, JBuilder 3 has something to offer.

JBuilder 3 implements Java 2 using JDK 1.2. It generates stock-standard Java with no custom tags, which makes programs portable to any conforming Java environment on any platform. JBuilder 3 comes in three editions: Standard, Professional and Enterprise.

The Enterprise version is accompanied by more than 300 JavaBean components, ready to build into your application. These include the JFC/Swing and JBCL user interface components and a variety of database access components. These components make it easier to build interfaces.

If you're developing database applications, you have a number of choices. JBuilder 3 supports the JDBC API. Based on the X/Open SQL Call Level Interface (CLI), JDBC provides platform-independent connectivity to a variety of databases including Oracle, Sybase, Informix, DB2 and Inprise's own InterBase. The JDBC-ODBC bridge also provides connectivity to all ODBC databases. The JDBC Explorer provides a simple way to view and manage databases, while the JDBC SQLBuilder allows you to visually design queries. Because the JDBC SQL-Builder is a Java program, it accesses the databases using the same JDBC drivers as your programs. This should provide consistency in the query results.

If that seems like overkill for your database needs, you might find JDataStore useful. It comes with JBuilder 3 and is a Pure Java, embeddable database, well suited to make small-footprint, portable database applications.

For fully distributed applications, JBuilder 3 provides extensive support for CORBA, using Inprise's VisiBroker or Iona's OrbixWeb. Using the Application Generator and Data Modeler tools, you can quickly generate CORBA servers and clients and HTML front ends to CORBA servers using servlets. The ORB explorer presents a graphical view of VisiBroker naming services and interface repositories from within JBuilder, which makes it relatively simple to manage the CORBA services.

JBuilder 3 also delivers some powerful debugging features, including:

- Java 2's new JVMDI debugging API;
- Multi-JDK debugging for applications which use JDK 1.1.5;
- Multiprocess debugging; and
- Remote debugging.

The integrated PVCS version manager provides source code control for multidevelopers projects, and the Open Tools API allows developers to plug in their own productivity tools.

One of the highlights of JBuilder 3 is the use of Inprise's Two-Way-Tools. Wherever a graphical tool generates source code, you can either edit the code using the graphical tool or edit the source code directly. Changes are propagated in both directions.

The help system provides plenty of information, but it's often hard to find exactly what you want. A little more indexing and cross-referencing would certainly be helpful. The technical descriptions tend to assume a lot of prior knowledge, but that knowledge is not always available on the help system. The Java expert won't find this too much of a problem, but the novice will struggle. Perhaps that is a reflection of the fact that JBuilder 3 is a tool, not a toy.

The proof of any pudding is in the eating, and JBuilder 3 is the perfect testbed for itself. Eighty percent of the IDE and many of the tools have been written in Java. On the whole, it stacks up quite well, but like all Java applications, it's a little sluggish. On your latest high-end Pentium III that will be no problem, but on an older, slower machine it becomes clunky. Even on very fast machines, the IDE will sometimes pause noticeably. Perhaps it's waiting for the JIT compiler to catch up.

Of the eight classes of benchmark we ran, JBuilder 3 was the slowest in four tests and the second-slowest in four others. Although it is the easiest tool to use, Inprise still has to improve its performance.

JavaBeans

JavaBeans are components; the building blocks of Java applications. Each bean is a Java class which adheres to the JavaBeans specification. When you drag a component from a palette onto a form, you are working with JavaBeans. JavaBeans are either visual beans, which are visual components such as a push button, or non-visual beans, which are invisible components that bring some properties or methods to your form.

Highlights
- Good RAD features
- Plenty of component building blocks
- Good CORBA support
- Two-Way-Tool

Lowlights
- Help could be improved slightly
- Occasional pauses in the IDE

Distributor	Inprise
Phone	1800 632 266
Online	http://www.inprise.com.au/
Price	Standard Edition $160, Professional Edition $1,270, Enterprise Edition $3,980
In short	Close, so close.

IBM VisualAge for Java 2.0

Most Java IDEs have a similar look and feel, but IBM's VisualAge for Java is different. It is the only IDE reviewed that does not support JDK 1.2. VisualAge for Java 2.0 supports JDK 1.1.6, and beta versions of VisualAge for Java 3.0 (with JDK 1.2 support) are now available.

There are three editions of VisualAge for Java. The free Entry Edition allows you to preview VisualAge for Java's capabili-

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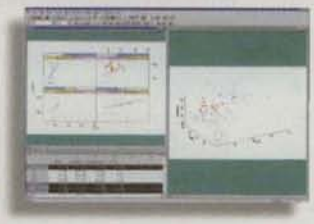

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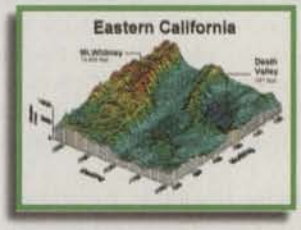

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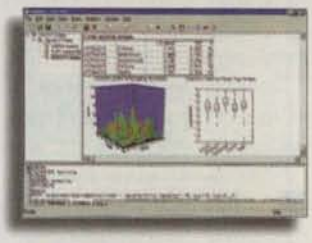

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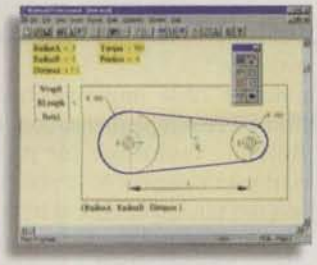

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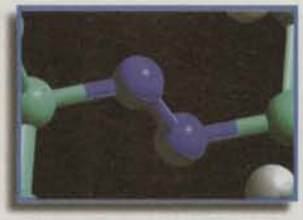
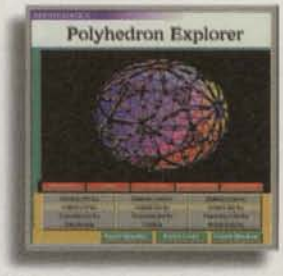


HyperChem

PC-BASED MOLECULAR MODELING

A sophisticated molecular modeling program that is known for its quality, flexibility and ease of use, HyperChem unites 3D visualisation and animation with quantum chemical calculations, molecular mechanics and molecular dynamics. HyperChem puts more molecular modeling tools at your fingertips than any other Windows program. With three different versions, it caters for all users and their needs. New advances since earlier versions mean that HyperChem provides a more powerful and flexible molecular workspace than ever before.



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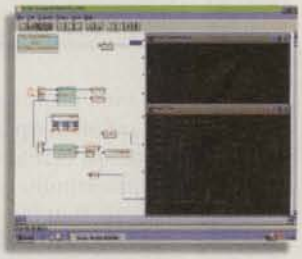

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An alternative language for Windows: Visual Basic

If you're not up to learning the ropes of C or Java, you might want to consider Basic (Beginner's All-Purpose Symbolic Instruction Code). As the acronym suggests, Basic is easy to learn and easy to use. This language has, in one form or another, been the staple of many PCs since the humble 8-bit console machine. It has matured over the years alongside the development of the PC. Today, there are many variations of Basic. There are many platform and development additions but, without a doubt, the most prevalent is Microsoft's Visual Basic.

With the advent of the Windows revolution, it made sense to reinvent this language for the GUI world, and Microsoft has done an excellent job with Visual Basic. Visual Basic retains the easy learning curve of Basic while harnessing the advantages of the Windows environment. You can use Visual Basic to build just about any application, but, as with C or any other language, advanced applications require studious reading of documentation in order to use the application programming interfaces (APIs).

Basic is an interpreted language, which means that statements are executed in-line at runtime. This is extremely slow and rarely acceptable for any application more complex than 'Hello World'. However, Visual Basic, like C, can produce compiled programs that run faster than interpreted Basic. When bundled with the Visual Basic runtime DLLs (dynamic link libraries, which save you developing common functions individually), Visual Basic allows users to create independent, easily distributable, compiled applications.

The Visual Basic development environment is simple, clean and well designed. Programming in Visual Basic is often quick and easy, but it has limitations. First, Visual Basic isn't as flexible as languages like C, and this can sometimes be frustrating to experienced programmers. Second, and more important, Visual Basic doesn't produce fast and small executables. This is the trade-off; quick development times, but low performance and efficiency. This is the ideal development environment for applications that need to be built quickly, but don't need high performance. As a result, Visual Basic is used heavily as a development tool in the home arena and for front ends to corporate applications, but C is still the language of choice for large, professional applications.

The Visual Basic product line also includes Visual Basic for Applications (VBA), which is bundled with products like Microsoft Office. Programs such as Word and Excel can use Visual Basic syntax to create scripts and other tools. VBA can also ease integration between Visual Basic programs and these applications. This is certainly a plus, because learning the language allows you to take advantage of a feature in applications that support VBA with just a little extra learning time.

If you've ever programmed in Basic, or you would like to try a command syntax that bears some relation to the English language, Visual Basic is an excellent way to quickly develop your own Windows applications.

The lastest edition of Visual Basic is version 6.0. For more information see http://msdn.microsoft.com/vbasic/.

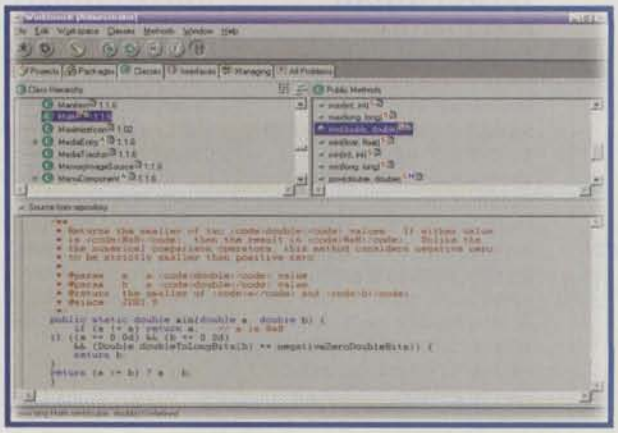
Ashton Mills

ties (available from http://www7.software.ibm.com/vad.nsf or on **apcmag.cd**). The Professional Edition is intended for intermediate-level programmers and developers of applications that require quick and easy access to relational databases, and the Enterprise Edition is a full-blown version for developing enterprise applications.

Like Sybase PowerJ, VisualAge for Java doesn't use native Java files. Unlike PowerJ, VisualAge for Java uses a code repository. All class information and code is stored in a central repository. This provides version control, multideveloper coordination and many other benefits. The VisualAge Workbench acts as a front door into the repository. It contains a set of tabbed panes that can display projects, packages, classes, interfaces and any problems that may be detected in programs.

The Visual Composition Editor (VCE) provides a drag-and-drop interface for creating and editing forms and dialogs. VisualAge for Java comes with an impressive collection of components, but unlike other IDEs, it doesn't attempt to place them all on a palette. Instead, only a few of the most common components (from the Swing and AWT sets) are displayed. Other components can be chosen from a list or located using search facilities.

Like the Sybase PowerJ IDE, VisualAge for Java provides an extra level of abstraction, which makes it easy to automate much of the development process. This is beneficial, but some difficulties will arise if you try to tweak the code manually.



The IDE is quick and responsive, even on slower PCs. This suggests it's probably a native code implementation, rather than a Java implementation like Borland JBuilder. VisualAge for Java gets full marks for robustness. It was the only tool that did not crash during testing.

The VisualAge for Java compiler allows incremental compilation. This means it only recompiles the changed parts of your project. For large projects this can mean substantial time savings.

The help system for VisualAge for Java is HTML-based with Java search capabilities. While this is a noble idea, it doesn't work as well as it might. The help system is fairly slow, and the incremental search feature, found in all of the other IDEs, is missing. The help content is excellent — probably the best of any of the IDEs that *APC* reviewed — but it tends to be difficult to use.

On the plus side, VisualAge for Java comes with excellent technology for extending legacy systems. Enterprise Builders are tools which build runtime connections between Java tools and legacy applications. VisualAge for Java 2.0 includes Enterprise builders for SAP, Notes, CICS, CORBA and Component Broker.

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The JDBC database connectivity provides access to a large variety of databases, and the Enterprise Edition is bundled with the Universal Developer's Edition of IBM's industry standard DB2 database.

VisualAge for Java also provides a high level of integration with IBM's other enterprise products, such as the eNetwork communications server and the Lotus Domino Web server.

The benchmark results for VisualAge for Java were not particularly impressive. Although it came second in several tests, its results were poor on the whole. VisualAge for Java ranks four out of five overall.

Highlights
- Good enterprise integration
- Easy management of complex projects
- Good component support
- Good CORBA support

Lowlights
- Help is hard to use

Distributor	IBM
Phone	13 24 26
Online	http://www.ibm.com.au/
Price	Entry Edition free, Professional Edition $207, Enterprise Edition $6,248
In short	A robust, well laid out, well-integrated tool.

Java Super Bowl VII

What do we want from our development tools? Products that assist developers to work quickly and effectively, even under extreme pressure. How do we test that? One way is the Java Super Bowl, run as part of the SD'99 (Software Development 1999) conference in the US last June. Java vendors are invited to send their best engineers to operate their Java tools. This year, Symantec, Inprise and IBM did battle for the coveted prize.

The competitors were D'Arcy Smith and Erik Buchez of Symantec, Joe Nuxoll and Blake Stone of Inprise, and Sridhar Narayanan and Tim duBoer of IBM.

They were each given 12 applets to code: a timer bean, an HTML browser, a configurable chess board, a program which would generate non-repeating numbers, dynamic method calls, a JFrame, a chart application, a class browser, a numeric display program, a class loader, a database application and a bouncing ball.

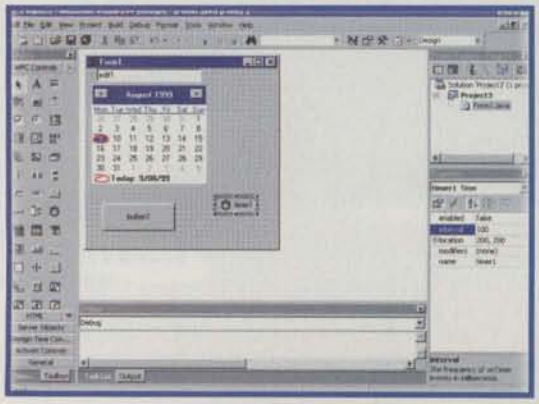
Inprise finished with 12,200 points, IBM had 7,000 points and Symantec had 5,900 points.

You could conclude that either Inprise has the most productive tools or the most competent engineers. Either way, it's a pat on the back.

Microsoft Visual J++ 6.0

Java is the great white hope of those who would like to see Microsoft's market share eroded. It allows you to write applications that will run on any platform. The applications can target Windows platforms and still provide viable applications for alternative platforms. Microsoft has responded to the threat of Java by reworking J++ 6.0 to produce Java applications that only work on Microsoft platforms. So why would anybody use Microsoft's Java, if it's not standard? Because it works very well.

Visual J++ 6.0 is a slick tool. Integrated tightly into Visual Studio 6.0, it provides a quick way to develop powerful Java applications. If you have prior experience with Visual Basic or Visual C++ then it won't take long to pick up Visual J++ 6.0. The component palette is well stocked, and it has never been simpler to drop components onto a form to produce an application. Its interface is remarkably similar to Borland JBuilder 3.



Its big problem is portability. Instead of the familiar AWT and JFC/Swing components featured on the other Java IDEs reviewed, there are WFC (Windows Foundation Class) components. WFCs are similar to the others except for one critical difference: they only work on Windows platforms. In addition to using non-portable classes, Visual J++ 6.0 includes two extensions to the Java language, the Delegate keyword and support for C-style preprocessor commands. A Delegate is similar to a C-style function pointer, while the preprocessor commands, like #define and #if, cause the compiler to be selective about which bits of code are compiled and executed. Sun provides a fairly strict definition of what is and isn't Java at http://java.sun.com/docs/overviews/java/java-overview-1.html. According to Sun's definition, Visual J++ 6.0 is not Java. Sun and Microsoft are currently locked in litigation over whether Microsoft can use the word 'Java' in reference to Visual J++ 6.0.

Consequently, if you want to write portable Java applications, then Visual J++ 6.0 is probably not the tool for you. You can still write portable Pure Java, but there are much better tools available for this. The IDE doesn't give you much help.

If you are happy to sacrifice portability for some extra performance, and you only use Microsoft operating systems, then Visual J++ 6.0 may be a good choice. Of course, if portability were not an issue you could probably get even better performance with Visual C++, but that's another story.

Visual J++ 6.0 allows easy access to ODBC databases and Windows DLLs. It provides excellent support for COM, but no support for CORBA. The IntelliSense code completion features help with coding, and there is good support for DHTML (dynamic HTML) generation. For developing Windows applications, it's not a bad tool.

It's interesting to note that Visual J++ 6.0 was the best-performing IDE in the benchmark tests. The tests used Pure Java, so there weren't any 'native code' benefits to Visual J++ 6.0. It won fair and square.

Highlights
- Easy to use
- Fast

Lowlights
- Non-portable
- Poor support for JavaBeans

Distributor	Microsoft
Phone	132 058
Online	http://www.microsoft.com.au/
Price	Standard Edition $189, Professional Edition $909, Visual Studio Professional $1,799
In short	It's easy to use and it performs well, but it uses proprietary extensions.

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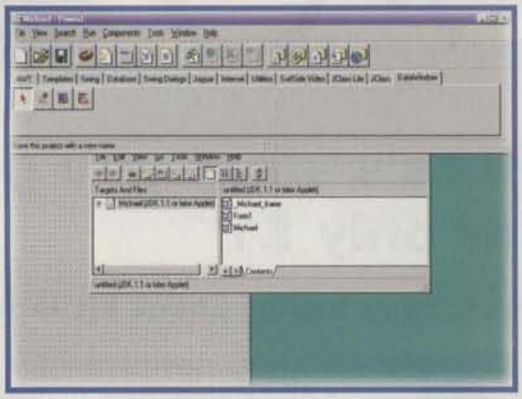
MI2BH

Sybase PowerJ 3.0

Sybase has a long history of delivering high-end enterprise tools, so the enterprise focus of Sybase PowerJ should come as no surprise. Sybase is perhaps best known for its Database Management System (DBMS) and its Powerbuilder 4GL tool. Both of which are at the cutting edge of enterprise development tools. PowerJ fits neatly into that family.



PowerJ works well to add a little pizazz to your personal home page, but that's not really what the designers had in mind. Supporting Java 2.0 (JDK 1.2), PowerJ is designed for big things. Client/server applications, Web commerce, database applications; we're talking about big pieces of software.

At first glance the IDE looks similar to the other Java IDEs. The palette of 90 or so drag-and-drop components is organised into the usual set of tabbed panels; the two-paned window manages the classes and files. Closer inspection, however, reveals a significant difference in the way the IDE works. While most other IDEs manage their source code by files, PowerJ manages it by classes. The IDE makes no use of .JAVA files, but instead uses its own proprietary file formats. When editing the code for a class or a form, the IDE write-protects parts of the code, and only allows you to edit the bits it thinks you should. When you deploy or run an application (or applet) the IDE does generate .JAVA files, but they contain a warning not to edit them as they will be overwritten by the IDE.

This restriction can be both a blessing and a curse. It certainly makes it harder to do something stupid, and it ensures that the code will be well laid out. In the absence of two-way tools, like Borland's JBuilder, it's an effective way to make sure that the code and the graphical environment stay in sync. For normal development, it's certainly a feature rather than a limitation, but programmers with a hacker mentality will find it restrictive.

The Enterprise version (also known as Sybase Enterprise Studio) comes bundled with a large array of tools. The PowerJ IDE provides the usual collection of components with drag-and-drop design for forms and dialogs. The debugger is sophisticated and provides a useful in-context debugging feature; you can run software in a target environment (such as Netscape, Internet Explorer or Sun JDK) while debugging the software with the Sybase IDE. The PowerJ IDE is responsive, even on older, slower PCs. This gives it the jump on some of the Java-based IDEs (such as Borland JBuilder 3) which were a little sluggish on slower machines.

In addition to the variety of components installed with the IDE, Sybase maintains a comprehensive collection of component links on its Web page at http://www.powersoft.com/partners/gallery/.

The Power Site Web development and publishing tool provides HTML and script editors, a component manager, a role-based security tool, and an HTML implementation of the Sybase DataWindow technology. The Enterprise Application Server (EAServer) includes the Power Dynamo Web server and the Jaguar CTS (Component Transaction Server). Jaguar CTS is a middle-tier transaction server. It provides management functions for distributed component-based applications including threading, locking, memory management and connectivity.

PowerJ provides support for distributed applications through the CORBA and IIOP standards. It also provides database connectivity with native drivers for Sybase and Oracle databases, plus JDBC and ODBC support for many other databases. Client-side caching can also give big performance boosts in database development.

The one black mark against Sybase PowerJ is that it was unable to run our benchmark program. Because PowerJ won't use raw Java files, we had to import the program code, but PowerJ was unable to import the benchmark, issuing a less than helpful error message.

Sybase PowerJ is a powerful Java development package, and has all the tools you need to develop enterprise applications. Its broad suite of tools and excellent integration make it a good choice for large-scale projects.

Editor's Choice

For smaller projects:
Symantec VisualCafé 3.0

For enterprise development:
IBM VisualAge for Java 2.0

All of the Java IDEs were powerful and easy to use. As expected, the IBM and Sybase IDEs came loaded with enterprise tools, and the Inprise IDE was close on their heels. Microsoft's IDE was easy to use, but produces non-portable code. Symantec's IDE was fast and simple, but lacks some of the heavy-duty enterprise features.

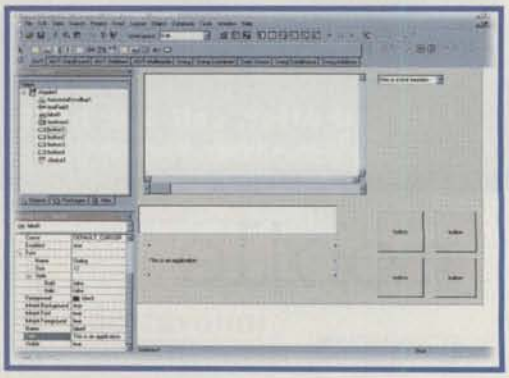
Highlights
- Good RAD features
- Plenty of component building blocks
- Good CORBA support
- Excellent tool integration

Lowlights
- Slightly less intuitive than other IDEs

Distributor	Sybase
Phone	1800 805 349
Online	http://www.sybase.com.au/
Price	$920
In short	A powerful but non-standard package.

Symantec VisualCafé 3.0

When you examine any product, it's inevitable that you will have some preconceived ideas. Before commencing this review, we expected Symantec VisualCafé to be out of its league. IBM and Sybase are well grounded in enterprise computing, and Inprise and Microsoft have high media profiles. We thought Symantec,



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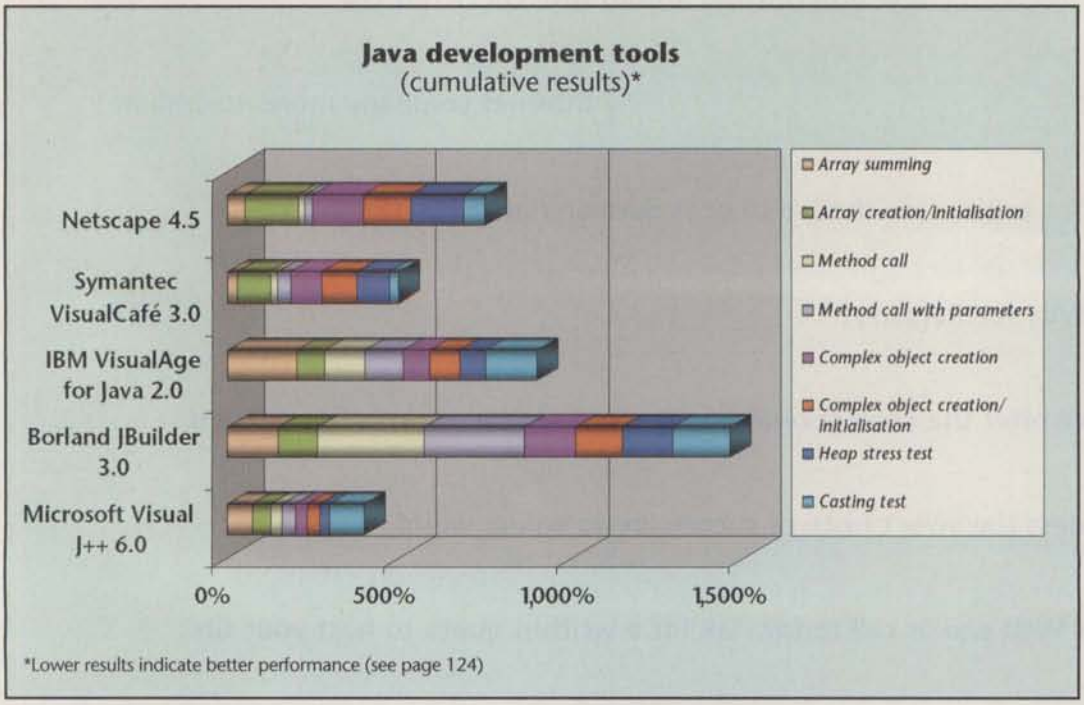

famous for tools like Norton Utilities and WinFax Pro, had surely made a mistake trying to take on the big guns.

As the test results came in and we read other reviews, it became obvious that VisualCafé 3.0 is not only a serious tool but a worthy challenger for the title of best Java IDE. It comes in three editions: Standard, Professional and Database.

Like all the IDEs reviewed, VisualCafé 3.0 comes with an integrated editor, debugger and compiler. It also includes a component palette and drag-and-drop design of forms and dialogs. As VisualCafé 3.0 uses native Java files and maintains a two-way link, graphical changes are reflected in the code, and code changes are reflected in the graphical design window. These are updated in real time.

VisualCafé 3.0 supports JDK 1.2 and all the latest Java techniques, including JavaBeans, JARs (Java Archives) and serialisation.

Although the component palette is a little light in the Standard Edition, it is stronger in the Professional Edition and there are extra components for database access through JDBC in the Database Edition. The Professional and Database Editions include wizards for servelet development as well as localisation and deployment. They also include enterprise features such as remote debugging and integration with version control tools such as PVCS, ClearCase, SourceSafe and Starbase.

The one place where VisualCafé 3.0 falls short is in the provision of tools to help with enterprise development. Where many of the tools are bundled with DBMSes, Web servers and data modellers, VisualCafé 3.0 doesn't provide anything in that class.

The benchmark results for VisualCafé 3.0 were quite good. It was the fastest in two of the eight tests and ranked second overall. The only IDE to rank faster was Microsoft Visual J++.

VisualCafé 3.0 is probably the best tool for small to medium projects.

Highlights
- Easy to use
- Fast
- Portable

Lowlights
- Lacks some enterprise tools

Distributor	Symantec
Phone	(02) 9850 1005
Online	http://www.symantec.com.au/
Price	Standard Edition $159, Professional Edition $485, Database Edition $1,290
In short	Full-featured, but a little light on enterprise tools.

Java benchmark results*

	Borland JBuilder 3.0	IBM VisualAge for Java 2.0	Microsoft Visual J++ 6.0	Symantec VisualCafé 3.0	Netscape 4.5
Array summing	147%	201%	72%	29%	51%
Array creation/initialisation	114%	81%	54%	96%	155%
Method call	311%	118%	32%	21%	18%
Method call with parameters	289%	111%	38%	38%	24%
Complex object creation	148%	77%	35%	92%	147%
Complex object creation/ initialisation	137%	87%	36%	102%	139%
Heap stress test	146%	76%	29%	95%	153%
Casting test	165%	147%	101%	25%	62%
Average	182%	112%	50%	62%	94%

*Lower results indicate better performance (see page 124)

MicroGram Computers

Windows Terminal

This windows based terminal is suitable for both NT Terminal Server & Citrix Metaframe as well as being configurable for Unix hosts. It supports Microsoft's RDP and Citrix ICA3 protocols. In addition, it also emulates a number of standard terminals. Ports provided include DB25 parallel port, two DB9 serial ports, two USB ports, VGA DB 15, PS/2 mouse & keyboard ports & audio in & out. It is used in conjunction with a standard monitor, keyboard & mouse.

Cat. 1214	**Windows Terminal**	$1299

Serial and TCP/IP Ethernet LAN terminals.

Cat. 1026	**Serial Terminal 115.2Kbps**	$469
Cat. 1133	**Serial Terminal 460Kbps**	$489
Cat. 1104	**TCP/IP Ethernet LAN Terminal**	$499
Cat. 1134	**TCP/IP Ethernet LAN Terminal with LPD**	$519

10/100BaseTX Ethernet Switches

Each port on these 8 & 16 port switching hubs is a 10/100 BaseTX auto negotiation port which supports half & full duplex transmission. If your network has continual collisions (with consequent drop in network performance) this hub will switch a dedicated path between the sending & receiving computers thus preventing collisions and improving performance & usable bandwidth.

Cat. 11322	**Ethernet Switch Hub 8 Port 10/100BaseTX**	$459
Cat. 11323	**Ethernet Switch Hub 16 Port 10/100BaseTX**	$899

Ultra DMA 66 HDD PCI IDE Controller

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Cat. 2809	**HDD Cont PCI IDE Ultra DMA 66**	$159
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Cat. 10108	**Dual Speed IP Gateway Hub**	$699

A dual port Internet Access Server is also available. The second line can be set to dial when the first line reaches a nominated percentage of full load. UTP and BNC connectors are provided.

Cat. 10112	**Dual Port Internet Access Server UTP/BNC**	$559

Rack Mount Industrial Case (PCI/ISA)

Provides up to 14 slots, 2 x 5.25" and 2 x 3.5" drive bays, this 19" case supports a number of different backplanes. Other features include, a ball bearing cooling fan and a hold-down clamp for plug-in AT or XT cards. It can accomodate either an industrial 350W or standard 300W power supply. The ATX case model includes a 250W ATX power supply.

Cat. 17055	**Indust. Case 19" Rack 14 slot Passive BP**	$899
Cat. 17056	**Passive Backplane PCI/ISA 14 slot**	$229
Cat. 8895	**Indust. Power Supply 350W PS/2 AT**	$365
Cat. 8894	**Power Supply 300W PS/2 AT**	$175
Cat. 17058	**Indust. Case 19" Rack 14 slot ATX M'Board**	$1150

Industrial CPU Card

A full size industrial CPU card which supports Pentium II Celeron CPU. The card provides support for 512MB EDO/SDRAM, four IDE drives/devices, two floppy drives, one RS232 serial port, one selectable RS232/422/485 port, one SPP/EPP/ECP parallel port, two USB ports, VGA display & 16 level watchdog timer.

Cat 17057	**Industrial Full Size CPU Card (no CPU)**	$1230

Year 2000 BIOS Card

This card carries the NSTL "Compatibility Test" seal.

Even Pentium motherboards are not immune to the Y2K bug! This Year 2000 BIOS Card solves the problem of progression from 1999 to 2000 as well as 21st century leap years & also double-buffered to take care of the Crouch-Echlin effect.

Cat. 3359	**Year 2000 BIOS Card**	$129

PCMCIA Card Drive for Desktop PC

This high performance PCMCIA Drive provides two front-access sockets on the 3.5" front bay and is connected to the Interface Adapter by ribbon cable. The drive supports DOS & Windows 3.1x, Windows95/NT 3.5x & 4 and OS/2 Warp 3.0 & 4.0.

Cat. 6121	**PCMCIA Card Drive for Desktop PC**	$219
Cat. 6458	**PCMCIA Card Drive & FDD**	$399

Digital "Film" Reader/Writer

Transfering images from your digital camera can be S-L-O-W. These reader/writers connect to your parallel port & appear as another "drive" in Windows Explorer.

Cat. 6459	**Compact Flash Card Reader / Writer**	$189
Cat. 6603	**Smart Media Card Reader/Writer**	$279

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C++ development tools

Borland C++Builder 4

Borland C++Builder 4 focuses on three basic needs of software developers; rapid application development, enterprise tools and reusable code.

The comprehensive collection of components is an effective aid to rapid development. It features user interface components, database components and Internet components. Following the tutorial instructions, we generated a working database browse application in just a few minutes, without writing any C++ code.

When you do get down to cutting some code, the code completion and parameter completion features can be a big timesaver. One disadvantage is the lack of a background build feature, but the compile times are blazingly fast. Incremental Linking saves time when you make a small change to a large project. For the really keen, Borland C++Builder 4 comes with Turbo Assembler for manually optimising your code.

The new Action List feature is a major productivity tool. Frequently, a particular action is initiated by one of several different interface elements, such as a Menu Item, a Toolbar Button or a Hotkey. This can make it difficult to avoid code duplication, and can lead to maintenance nightmares if a code change must be repeated in several places. If an action is temporarily disabled, such as a Paste action when the clipboard is empty, it may need to be disabled in multiple locations. With an Action List, you can implement an action in a single place and manage links to it in a simple manner.

On the enterprise front, Borland C++Builder 4 comes with some heavy-duty database support. Supported databases include Oracle8, Microsoft SQL Server, Microsoft Access, Sybase, Informix, IBM's DB2, Microsoft Visual FoxPro and Inprise's own Interbase SQL server (which ships with the Enterprise Edition).

Borland C++Builder 4 now provides component-based support for COM and CORBA. This makes development of distributed systems much easier, because writing low-level code for either of these is a nightmare. The CORBA support steals a march on competitor Microsoft Visual C++ 6, which has excellent COM support but offers limited assistance for CORBA development. Inprise's VisiBroker, which also ships with the Enterprise Edition, provides Object Request Broker (ORB) services. As CORBA server applications are generated using ANSI C++, they can be recompiled and deployed on non-Windows host systems if desired.

Inprise MIDAS, which is also supplied, provides a robust set of tools for developing distributed solutions. Built-in PVCS version tracking and the Advanced Project Manager allow effective version control, which helps with project administration.

The benchmark only tested a small subset of the compiler's features, stream I/O and the list and string classes from the standard library. However, results in these areas were sufficiently bad to raise concerns about Borland C++Builder's overall performance.

Borland C++Builder 4 represents a serious effort on the part of Inprise to promote code portability and reusability. It wants to make it as easy as possible to switch from other compilers. The compiler fully supports the ANSI/ISO standards for both C and C++, including the standard C++ library. It also implements a number of features from the almost-finalised C9x standard. A particular focus is compatibility with market leader Microsoft Visual C++ 6. You can import Visual C++ project files or simply build a Visual C++ project without modifying the project file. There are still a few compatibility issues with this version, particularly with Visual C++ projects that use ATL and COM features, but it's getting pretty close.

Overall, C++Builder is a good product for small developers through to major enterprises. Users of Borland C++Builder 3 will probably want to upgrade. Developers who want to work with CORBA may well want to switch from Microsoft Visual C++ 6, but others might not find compelling reasons to do so.

Highlights
- Full support for the Standard Template Library (STL)
- Action lists
- Dual CORBA/COM support
- Compatible with Microsoft Visual C++
- Good compile speed

Lowlights
- No background compilation
- Slow at certain tasks

Distributor	Inprise
Phone	1800 632 266
Online	http://www.inprise.com.au/
Price	Standard Edition $160, Professional Edition $1,270, Enterprise Edition $3,980
In short	A worthy challenger to Visual C++.

Microsoft Visual C++ 6.0

The latest version of Visual C++ is a good tool in a long line of good tools.

The IDE looks very much like version 5.0, which is an advantage because it means minimal retraining. The IntelliSense command completion is handy, as are the tool tips that pop up and tell you the required function arguments. They minimise the number of times you need to refer to the online help. The help system is comprehensive but slow. If you have more than one Visual Studio product, such as Visual Basic or Visual FoxPro, it becomes very difficult to find the help topics relating to Visual C++ because they are all mixed in together.

The compiler is slow but fairly thorough. Compile time for the benchmark program was by far the slowest, but the runtimes were the best. The ability to compile in the background is a big help, and makes slow compile times more bearable. Visual C++ 6.0 provides full support for ANSI C and ANSI C++ with one annoying exception. The ANSI C++ standard changed the scope rules for variables declared as part of a 'for' statement. For example:

```
for (int i=0; i<MAX; i++) {
  // do some stuff
 }
 std::cout < i;  // Line 4
```

In pre-ANSI C++, the variable 'i' had scope of the surrounding block, so line four is legal. This was changed with the ANSI standard: 'i' now has scope of the loop, so line

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four becomes a syntax error. Visual C++ 6.0 retains the pre-ANSI scope, and so is not truly ANSI compliant. This can be quite annoying when porting from another compiler, as correct code will break.

The Visual C++ 6.0 compiler provides an interesting extension: the _assume() keyword. This keyword provides a mechanism to give hints to the optimiser. By assuring the optimiser that certain conditions are true, you give the compiler more room to optimise the code. The theory is great, but it's a little hard to use in practice. Apart from two examples given in the documentation, programmers are given few clues as to what sort of assume() declarations the compiler is looking for. A little more information could make this a powerful feature.

There are some backward compatibility problems with the DLLs shipped with Visual C++ 6.0. MFC42.DLL and MSVCRT.DLL are rumoured to break some existing applications built with earlier versions of the compiler. A clause in the licence agreement (which you acknowledge when installing Visual C++ 6.0) states that you indemnify Microsoft against any damage caused by redistributing their libraries. If you ship your product (built with Visual C++ 6.0) and it overwrites an old DLL and breaks another application, it is you who could be sued, not Microsoft. Care is advised.

The new edit and continue feature is the one show stopper in Visual C++ 6.0. If you notice a bug while debugging, simply correct it and continue. The compiler can do a quick rebuild and continue executing where you left off. This will save a lot of time when debugging large programs.

Visual C++ 6.0 comes with a useful set of wizards which take much of the drudge out of creating software. It features wizards for applications, DLLs and ATL components. Each wizard asks a series of questions and generates a framework, and even set up complicated database frameworks.

As always, the Microsoft Foundation Classes (MFC) library provides a plethora of useful classes for just about everything from string management to FTP. The Active Template Library (ATL) provides a simple way to program with the Common Object Model (COM). COM is an excellent solution for component-based development, Web development and even client/server development, providing you only need to work with Microsoft OS platforms. Support for CORBA would have been handy to interface with other systems.

Visual C++ 6.0 comes with the usual collection of useful tools. Two of the newer ones are worthy of comment. Visual Source Safe, the source code control system, provides an effective way to handle multideveloper projects. Visual Modeler is a cut down version of Rational Systems' Rose CASE tool. You can model classes and relationships, which provides useful CASE support to the object-oriented developer.

All in all, Visual C++ 6.0 is a strong performer. It's not perfect, but it's a viable choice for Windows developers, particularly those who don't need CORBA support.

DJGPP/RHIDE

DJ Delorie's Windows port of the GNU C++ compiler is an interesting alternative to the big guns. Known as DJGPP, the GNU compiler is often used with Robert Höhne's IDE (called RHIDE).

DJGPP is a full-featured ANSI/ISO-compliant C++ compiler. It generates Win32 console executables. RHIDE is modelled on the old DOS Turbo C IDE. It comes with an integrated debugger and extensive help.

There are numerous add-ons available, including a Windows library to generate Windows executables. However, the real strength of the tools is in building portable, command line C++ programs.

One of the best features of DJGPP is the price: it's free. You can download DJGPP, RHIDE and a bunch of other tools (plus source code for the lot) from http://www.delorie.com/.

DJGPP, including a full implementation of the Standard Template Library (STL), strictly conforms to ANSI standards. This, combined with the fact that its free, makes DJGPP a popular choice for educational institutions.

While DJGPP isn't a serious challenger to Visual C++ or C++Builder, it's very good at what it does.

Highlights

- Excellent COM support
- Background compiles
- Edit and continue debugging
- Generates fast executables

Lowlights

- No CORBA support
- Not quite ANSI/ISO compliant

Distributor	Microsoft
Phone	132 058
Online	http://www.microsoft.com.au/
Price	Standard Edition $189, Professional Edition $909, Enterprise Edition $2,159, Visual Studio Professional $1,799
In short	The market leader, and with good reason.

C++ benchmark results*

	Read time	Sort time	Write time	Total	Compile time
Borland C++ Builder 4	16.877	2.436	14.832	34.145	11.2
GNU DJGPP 2.8.1	0.952	0.458	2.198	3.608	8.2
Microsoft Visual C++ 6	0.897	0.677	1.683	3.257	22.1

*In seconds; lower results indicate better performance (see page 124)

Workshop

Welcome to Workshop. This section is dedicated to bringing you all manner of tips, interesting information and do-it-yourself tutorials. Within these pages you will find useful shareware, informative operating system-specific columns and in-depth programming tutorials.

All files mentioned in Workshop can be found on **apcmag.cd** or downloaded from our Web site at http://apcmag.com/. You can join one of our online discussion forums to discuss technical issues or to voice your opinion on any related topic.

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A full archive of Workshop articles can be found online at http://apcmag.com/workshop/.

Stephen Withers, Workshop editor

Tech Talk

Technobabble introduces wireless communications technologies, and **Step by Step** explains some of the more important BIOS settings.

Operating Systems

The **Windows 98** column reviews Windows 98 Second Edition and Service Pack 1. The **OS/2** column teaches you a more elegant route to PDF file creation, the **Mac OS** column guides your migration to a new computer and the **Linux** column explores the PostgreSQL database.

Each of the four OS columns include a roundup of the best shareware for that platform. Full reviews and trial copies can be found on **apcmag.cd**.

Programming

The **Simple C++** column explains abstract data types, and the **Java** column shows there's more to buttons than meets the eye.

Pocketbooks

The *Linux Pocketbook* was a sell-out success and many readers have been eagerly awaiting the *Revised Edition Linux Pocketbook*. It's now available.

You can learn how to install and explore Linux easily using this guide. Everything you need to get started and make the most of Linux is included on the cover CDs, including the full release of Red Hat Linux 6.0 and Open Linux 2.2-N.

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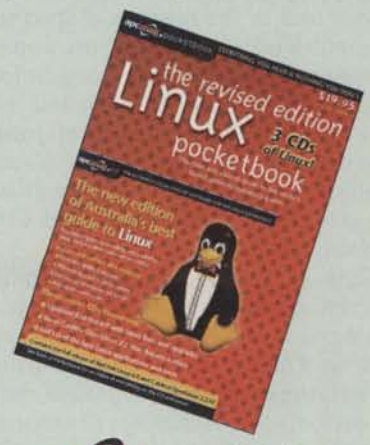

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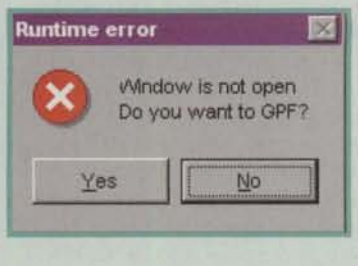
Bug of the Month

Our bug *du jour* (or bug *du mois*?) comes from Chris Watson. Chris is a practitioner of the declining art of Clarion programming. Not necessarily a *good* practitioner, but a practitioner nonetheless. Chris' program, written in Clarion 5.0, was designed to produce a report, but the report contained no data. Instead of rudely crashing, as software is prone to do in such circumstances, the Clarion runtime generated the following polite request:



What more could you ask for? For his trouble, Chris gets to choose a prize from the vast collection in the Workshop prize cupboard. Unfortunately, none of the software has such good manners.

Win! Win! Win!

Workshop is always on the lookout for the most interesting, strange, funny or downright weird software bugs you can find. These include code snippets, features that function poorly, or things that crash a particular application. Anything and everything buggy deserves mention.

Send us your favourite bug via email to bugs@acp.com.au or snail mail, and you'll be in the running to win a software prize. Please send screen captures, example code listings or detailed instructions to trigger a bug in an application, as appropriate for your entry.

The winner's name, along with details of the bug, will appear in the Bug of the Month column in the December edition of *APC*. So start hunting!

Michael Smith

Fancy writing for Workshop?

Each month, Workshop aims to bring *APC* readers detailed information on how to get the most out of their computing experience. We're constantly looking for new writers and suggestions on areas you want to see covered. If you're interested in writing for Workshop, please send a brief email outlining your areas of expertise, topics you'd be interested in writing about and samples of your writing to apc@acp.com.au.

Cast off your cables and landlines — it's time to go wireless.

By Nathan Taylor

Technobabble

Having covered some of the vagaries of telecommunications in the past few Technobabbles, we thought we'd discuss some of the wireless communication options available today.

The mobile phone system

For much of the lifetime of the mobile phone network, Australia used an analog system called Advanced Mobile Phone System (AMPS) for mobile phone services. A few years ago, the Federal Government decided that in the interests of spectrum conservation and security, all analog mobile phone services would cease by January next year. Since then, mobile network providers have largely migrated their existing customers to GSM (Global System for Mobiles). Although not all service providers use standards-based GSM, the major ones do.

GSM is a European Telecommunications Standards Institute (ETSI) specification for delivering digitally compressed voice at 9.6Kbps over a single narrowband channel. It uses *time-division multiple access* for bandwidth contention between mobile phones — a system whereby each phone is given tiny time slices of the available spectrum in which to deliver their messages.

GSM is the de facto standard for most of Asia and Europe, but the US and some rural locations in Australia continue to use AMPS. Both are slowly migrating to digital services, but in the US several other contenders are being considered for digital services, including CDMA (code-division multiple access) systems and digital AMPS (D-AMPS). D-AMPS allows existing AMPS infrastructure — but not handsets — to be converted to digital. Additionally, although GSM is supported in some places in the US, a different spectrum band is used, and very few new mobile phones can support both the 900MHz band used in most of Australia and Europe and the 1,800MHz band used in the US.

Connecting to the Internet over mobile phone

There's no doubt that connecting to the Internet via a mobile phone is going to be expensive. You (or preferably the company you work for) pay timed call charges as well as ISP fees, and generally get a poor, slow connection in return. However, it is an option for those who travel a lot and work on the road.

Using an AMPS phone for communications via a modem is similar to using a standard landline — albeit an extremely poor quality one. The modem uses standard protocols and processes for handshaking and data delivery, and you should be able to connect to any landline ISP.

One big problem when connecting to the Internet using a mobile phone is the lack of a standard means of connection between modem and phone. Each phone vendor has a proprietary plug that supports connection, but modem vendors do not have kits available for all phones. Desktop modems almost never support such things, although a number of PC Card modems do.

Australia's switch to GSM was not really to the advantage of mobile users. While a move to digital may seem like a good thing for data communications, the reality is that GSM channels are restricted to just 9.6Kbps — and you can't apply compression to that, because the network itself already takes care of compression. Consequently, doing anything bandwidth-heavy over GSM is an exercise in futility. Even downloading email and Web pages without graphics can be very slow. On the upside, the connection is clean and not likely to drop out.

You cannot use a standard modem to connect to a GSM mobile phone, even if you have the proper connection kit, because the signalling is fundamentally

WAP

Anybody who has ever used a Nokia Communicator would be aware of the limitations of using a mobile phone, pager or PDA device for Web browsing. The screen is so tiny that most Web pages come out mangled and illegible.

In response to this problem, a group of companies including Motorola, Ericsson, Nokia and Unwired Planet (now called Phone.com) developed the wireless application protocol (WAP) standard. A version of the Web for mobile phones, WAP is designed to deliver Web-like information in a format suitable for small, portable devices.

The WAP standard describes the markup language, Wireless Markup Language (WML), which is similar to HTML but designed specifically for the limitations of mobile phones. A browser known as a 'microbrowser' then renders the page. There is also a scripting language based on JavaScript, called 'WMLScript'. Using standard HTTP protocols, a network provider can deliver WAP pages to mobile users.

There are many potential applications of this technology. The most obvious is the provision of up-to-date news services to mobile customers. CNN, for instance, has already inked a deal with Nokia to provide a WAP-based news service for Australian customers.

The catch, of course, is that completely new mobile phones will be required to support the standard. WAP-capable phones are still thin on the ground, and aren't expected to take off until next year.

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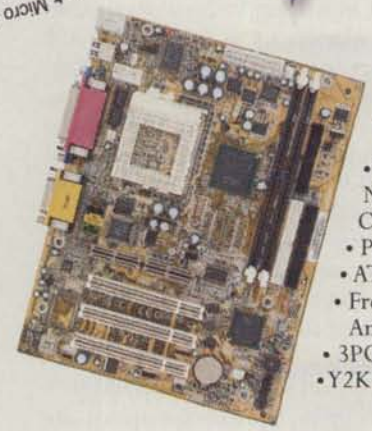

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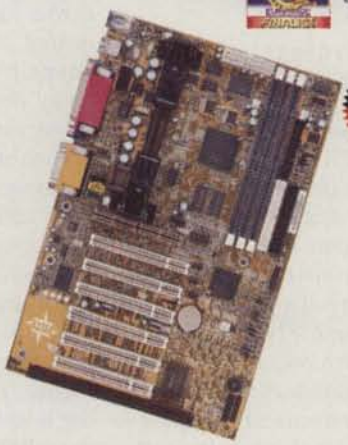

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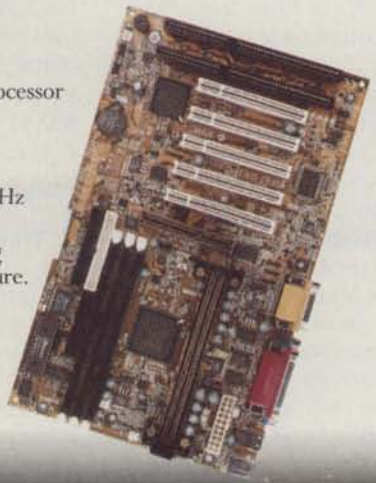

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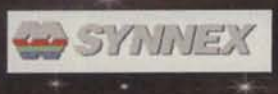

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different. You need a GSM modem (more appropriately called a 'terminal adaptor'). GSM modems are available in the form of PC Cards from several vendors, and a large number of newer GSM mobile phones have connections for such devices. At least one vendor already has a phone with a modem built in, which connects to a computer via the IrDA port (see 'Short-range wireless').

You will also need a GSM Internet service provider. Most ISPs will not support connections via GSM, but you can contact your mobile network provider for more information.

In a few years time, the next iteration of GSM should begin to be implemented in Australia. Called third-generation GSM, or 3G, the new standard will technically enable data rates of up to 384Kbps. However, it is yet to be determined how much of this we will see in practice, and what the cost of such speeds will be. For more information, see *APC* December 1998, page 76, or **apcmag.com**.

Short-range wireless

Cabling is not just a problem for LAN administrators, it's also a problem for PC and notebook users. It limits the number of devices that can be connected, restricts device placement and mobility, and is unsightly in many instances.

For some time there has been a wireless standard that overcomes the cabling problem, but few people use it.

The Infrared Data Association (IrDA) developed the IrDA standard to provide high-bandwidth communications over inexpensive and ubiquitous infra-red transmitters and receivers — much like those found in television remote controls. Simple infra-red pulses from a diode transmit information. The frequency determines the message sent.

There are actually three standards developed by IrDA; IrDA Data, IrDA Control and AIR. In most instances when people talk about IrDA, they are referring to the first of these standards, as are we.

The IrDA standard was designed to allow communication between notebooks, printers, PDAs, camera, phones, LAN devices and other devices over a very short range, generally 1m or less. It has a narrow cone of reception of about 30°.

IrDA devices are designed to transmit data at speeds ranging between 9,600bps to 4Mbps. For some time, 115.2Kbps — the speed of a standard serial port — was the go for most devices, and few yet support 4Mbps. Nonetheless, IrDA continues to develop the technology, and a 16Mbps transmission standard is in the works. Each of the standards is backward compatible.

Currently, almost all notebooks come with an IrDA transmitter/receiver, the speed of which depends on the age of the notebook. Most support 4Mbps, but devices that support the standard are rare. The few printers and LAN access devices that are available are generally difficult to find and often expensive. Consequently, most IrDA ports sit unused for the lifetime of the notebook.

Bluetooth is a much newer standard for short-range wireless communication, and is often considered to compete with IrDA. Unlike IrDA, which uses light pulses, Bluetooth uses radio frequency (RF) transmission to facilitate communication between devices. There are a number of advantages to this; in particular, range and direction are less of a problem than with IrDA. Bluetooth uses an FHSS (Frequency Hopping Spread Spectrum) mechanism to avoid transmission conflicts.

Most Bluetooth devices will operate with a 10m range, but the signal can be transmitted 100m or more by boosting the power. It can transmit through solid, non-metal objects such as walls. Unlike IrDA, where you have to effectively point devices at each other, Bluetooth is omnidirectional, so devices just have to be in range of each other for it to work. Up to eight devices can operate on the same area, or 'piconet'.

Operating in the 2.4GHz frequency spectrum, known as the ISM (Industrial, Scientific and Medical) band, Bluetooth does require the support of local governments. Whereas infra-red transmissions are largely unregulated, radio frequencies are tightly controlled in most nations. Fortunately, in Australia, as in most of the world, the spectrum issue has been resolved and the ISM band is generally licence-free. However, Bluetooth controllers still have to contend with some remote controls, microwave ovens and cordless phones that also operate in this band.

At this point in time, Bluetooth's aggregate bandwidth is limited to 1Mbps, one-sixteenth of the current potential of IrDA, but for most applications that is enough.

Wireless networking with Bluetooth, however, could be painful. Because it is omnidirectional, Bluetooth must perform a set of tests to discover which device should receive the data, and must institute security measures at the lowest level to ensure that other devices within range receiving the data cannot read it. IrDA has no such measures because of its directional nature, although encryption and security can be instituted in the applications using the IrDA link.

Right now, IrDA only costs a few dollars to implement in most devices, while Bluetooth is somewhat more expensive. The initial implementation is likely to cost $20 or more per port, which is a substantial cost; it may limit its uptake in the short term. We have yet to see any retail devices in Australia, although a few demonstration models have been floating around.

Wireless LANs

Until recently, most wireless LAN products were proprietary solutions using the 900MHz or 2.4GHz frequency bands. Products from different vendors were not, as a rule, interoperable, and devices tended to be expensive. The IEEE, the standard-bearer for Ethernet LAN technology, has now announced the 802.11 wireless LAN standard, and more standardised approaches to set up wireless LANs (WLANs) should emerge. Apple's AirPort wireless networking option on its iBook notebooks uses 802.11. In terms of signalling, the standard is quite similar to Bluetooth, so we should soon see devices that support both Bluetooth and 802.11.

Under the standard, radio frequency (RF) transmissions are used to deliver data to remote nodes. The standard defines two means of modulation, both of which use a *spread spectrum* technique. DSSS (Direct Sequence Spread Spectrum) and FHSS (Frequency Hopping Spread Spectrum) are designed to deliver robust and secure signals across RF links. The former keeps on changing its frequency, while the latter uses very wide bands and transmits additional error-correction information. It is subjective which is better, but under the 802.11 standard, DSSS can provide 2Mbps of data, while FHSS can deliver 1Mbps. IrDA is technically supported by the standard, at up to 2Mbps.

Transmission is controlled by contention; a party that wants to send signals will listen in to the frequency. If there's data flowing, then it will wait before sending. If the channel is clear, then the device will start to send packet information. (See *APC* April, page 129, or **apcmag.com** for more information on LAN contention.) The system also uses MAC (Media Access Control) addressing, much like Ethernet.

With increased uptake, WLANs could make cable and port management for LANs a thing of the past, particularly for mobile nodes. Armed with a notebook, for instance, you could simply walk into an office and be immediately networked — no cables required.■

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BIOS settings decoded.
By Daniel Rutter

Step by Step

Your computer's basic input/output system (BIOS) is the software that runs when the computer's turned on or rebooted, before the operating system starts. It handles functions such as interfacing with the keyboard and disk drives, and making the serial and parallel ports work. It has various settings that affect the way the low-level hardware works.

The distinctive blue BIOS setup screen is a user-unfriendly hangover from the early days of IBM-compatible computing. Fortunately, most people don't need to do much with their computer's BIOS these days, unless they change something drastic like a hard drive or the whole motherboard, or something goes horribly wrong.

However, there are a plethora of options in the modern PC BIOS and some of them have a significant effect on how well, and how quickly, the computer works. Many of these effects are negative, but people sometimes act on bad advice and change them anyway. Occasionally the BIOS settings also become scrambled, usually when new hardware is installed. This month's column discusses some of these options.

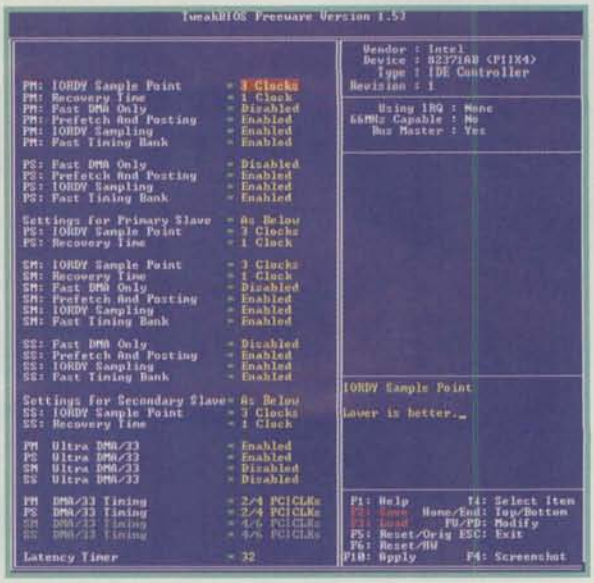
To access the BIOS setup screen for most PCs, press the Delete key shortly after booting — there's usually a 'press DEL for setup' or similar prompt at the appropriate moment, but it can be easy to miss. Some manufacturers use another key, for no obvious reason. There can be wide variation in BIOS features and their location, but because all BIOS setup programs use an elementary menu-based configuration interface, it's not hard to find them. If you can't find a feature, it's probably not there, but it could be hidden. The shareware TweakBIOS program (http://www.miro.pair.com/tweakbios/) allows you to change settings on the system and expansion card BIOSes that you couldn't ordinarily see.

It's almost impossible to paint yourself into a corner when twiddling your BIOS. Even a machine with badly broken BIOS settings can get as far as its BIOS setup screen again (although you may have to power-cycle it a few times), where you can restore the default settings and try again.

Running faster

Some motherboards, for example those from Abit, let you change CPU and system bus speed, and voltage settings from the BIOS configuration screen. You'll need to do this when installing a new processor, but it's also an easy way to play with overclocking.

Other motherboards give you some control over the processor speed via the 'turbo frequency' option. The Turbo buttons on old 386 (and earlier) computers were there to let you slow the processor down to a lower clock speed so even older software, especially games, wouldn't run too fast. The modern turbo frequency option is not nearly as drastic; it gives you a processor speed increase of just 5% or less, by increasing the frontside bus speed by that amount.



TweakBIOS lets you easily configure BIOS options that the standard setup utility doesn't show.

Almost any processor will work fine 5% faster than its rated speed, and it's very unlikely that anything else in the system will object, but 5% more speed is not worth getting excited about. By all means use the option if you like, but you probably won't notice the difference.

Cache settings

Many BIOSes give you the option to disable level 1 cache memory on your CPU, but it will cause a large performance drop, so you should only do this if you're using a broken CPU whose cache is malfunctioning. It's possible that this setting could be turned off through mishap or mischief, and if your computer suddenly gets a lot slower, this could be the reason.

A CPU with its level 1 cache disabled may be able to run at a higher core speed, but the computer as a whole will still be slower.

You should not disable level 2 cache either. Although level 2 cache memory can also hold back maximum overclocking performance, if you disable it, you're unlikely to get enough extra clock speed from the processor to compensate for the loss of performance. Again, it's possible that a glitch could turn it off. All current Slot 1 boards either automatically detect when they have a processor with no level 2 cache installed, and automatically set this option appropriately, or just don't care. As a result, you shouldn't have to change it if you install an old Celeron, or switch from one to a more recent processor.

Socket 7 motherboards (Pentium, AMD K6 and so on) have their level 2 cache on the board itself, and so may also have settings for how much cache RAM is installed. Slot 1 and Socket 360 processors (Pentium IIs and IIIs, and Celerons) include level 2 cache as part of the CPU package.

Many BIOSes let you play with the level 2 cache timing, a string of four numbers of the form x-y-y-y that indicate how many clock cycles are used to do a 32 byte burst read from the cache line. The first read is slower than the others, so the setting might be 3-1-1-1, for a total of six clock cycles. The timing is probably set to 'automatic' by default, which is usually how it should stay. If you set the timing lower you might improve performance, but it's more likely you'll just get crashes.

Current motherboards let you change various low-level settings for their SDRAM modules. You can change the RAS# to CAS# Delay, the Precharge Time, and the CAS Latency. For all of these settings, lower numbers are faster but won't necessarily give you a working computer. Twiddling RAM settings is really only useful if

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you're seriously overclocking; still, the automatic settings are likely to be the best.

As mentioned, disabling some extra-speed features can make a computer overclock more easily. IDE PIO (Programmed Input/Output) setting adjustment is another setting in that category. On current motherboards, this only lets you make your hard drives slower, but that may be necessary to make them work if they don't like an overclocked frontside bus speed.

Old IDE drives used Direct Memory Access (DMA) for data transfer, but more recent ones use PIO. PIO has five different modes, from 0 to 4. Mode 4 is the fastest, and the standard drive autodetection process will usually also automatically select the highest mode the drive supports. Drive autodetection is a useful feature which saves you from manually entering drive statistics so the PC can access the device. In the Standard CMOS setup page, the Auto setting will figure out which drives are connected all by itself.

The standard full-autodetection setting means the BIOS identifies its drives every time the computer boots. This wastes a few seconds. If you use 'manual' IDE autodetection (go to the hard disk setup page of the BIOS configuration and tell it to autodetect drives), the BIOS will enter the settings for the drives it finds and won't pause during subsequent startups. If you change or add drives, you'll need to go through the process again.

The Quick Power On Self Test provides a similar performance improvement, and many BIOSes have it turned on by default. Skipping some of the tests speeds up the computer's self-test procedure.

The Boot Up Floppy Seek option causes your PC to buzz the floppy drive on startup, as it looks for a boot disk. It is completely unnecessary in current PCs, and is included for compatibility with ancient drives that were unable to detect whether there was a disk in them without actually attempting a read operation. The floppy seek option is often turned on by default, and disabling it will speed up your startup by another second or two.

Traps

Many older BIOS-twiddling guides tell you to turn on the various 'shadowing' options, which copy system and expansion card BIOS data to different areas of RAM. This made sense in the days of DOS, when the operating system would by default thrash away at the BIOS ROM chips all the time. Copying the BIOS code somewhere else improved performance considerably. Current operating systems don't flog the hardware, and shadowing any or all of the different BIOSes in your system is at best useless, and can cause problems.

In some situations, scrambled BIOS settings will cause problems with the 3.5in floppy drive. If the drive is set at 5.25in, it will be able to read a disk directory and very small files, but anything else will result in an error. Change the setting back in the basic BIOS setup and all will be well again.

If plug and play is switched off in your BIOS, Windows 95/98 may have trouble setting up plug and play devices. Conversely, turning plug and play on when you're running an operating system that isn't plug and play-aware might cause problems. In some systems, this setting is not available at all, and in others it does nothing perceptible. However, if all of your shiny new cards are refusing to work and Windows is complaining bitterly about resource conflicts, check the BIOS.

Plug and play settings can also prevent the assignation of interrupt request (IRQ) and Direct Memory Access (DMA) addresses to particular expansion slots, which is sometimes necessary to make video cards work properly. When 'Automatic Resource Allocation' is turned on in the plug and play section of the BIOS setup, you can't manually assign addresses to slots. Turning it off lets you determine which slot gets which address. This can solve thorny plug and play debacles when a particular combination of hardware won't work properly with the auto settings. Once again, if you have bizarre conflicts or run out of resources when you shouldn't, check to see whether something is hard-addressed when it shouldn't be.

The popular BIOS 'virus warning' feature alerts you when software tries to access floppy disk boot sectors or hard disk Master Boot Records (MBRs), which is the kind of thing viruses do. However, the FORMAT command and various operating systems when they're installed also do this. The 'virus warning' just asks you to confirm that you really want the write to occur, and since most people rarely do anything to trigger it, it doesn't hurt to leave it on.

Daniel Rutter can be contacted at dan@dansdata.com.

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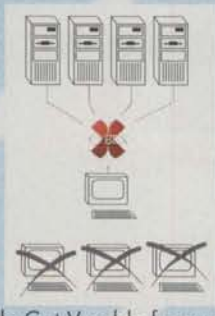

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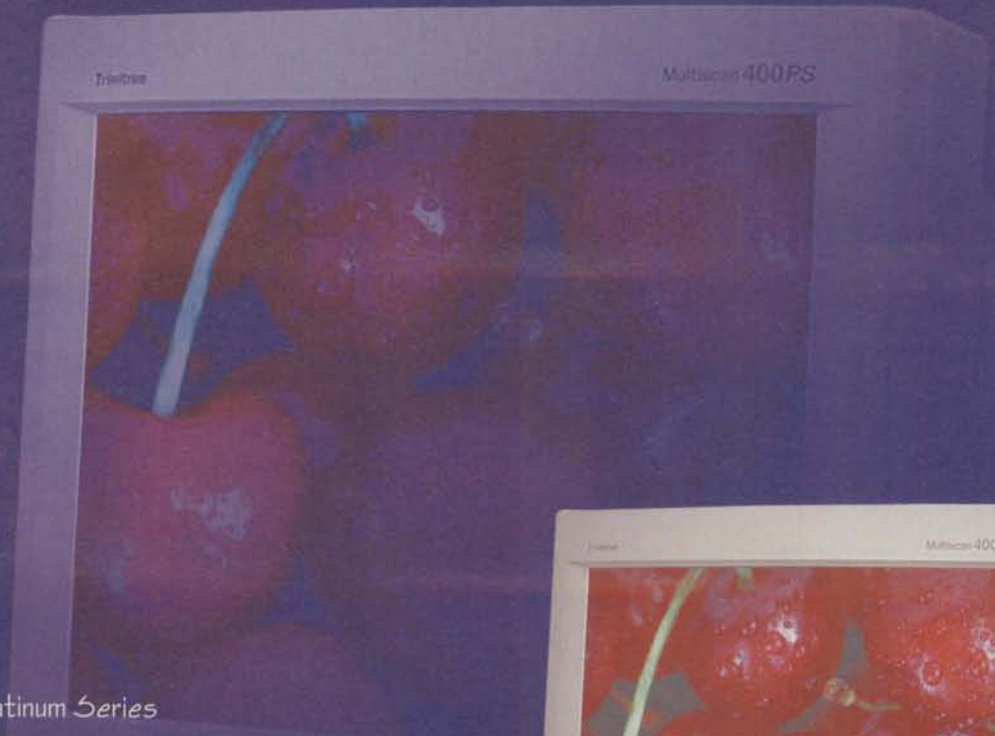

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It's not Windows 99, but there are some good reasons to keep up with Microsoft. **By Kieran McNamee**

Windows 98

It has been over a year since the release of Windows 98. Although it improved on Windows 95, Windows 98 was still criticised for its incompleteness; a month or so more of testing would not have gone astray. At the time, Microsoft promised to make a service pack available for the often unstable and buggy OS.

Finally, Service Pack 1 was released in June this year, after the release of a Second Edition of Windows 98. The Second Edition includes the patches and updates that the service pack provides, plus a few extras.

Windows 98

Windows 98 was launched in June last year and despite the fanfare, was considered only a modest upgrade to the successful Windows 95, which was launched in August 1995. The step from Windows 95 to Windows 98 was minor and involved only a handful of new features. The main feature was the browser-like interface provided by Internet Explorer 4 (IE4).

The emphasis of Windows 98 Second Edition is more on bug fixes and greater stability than new features. There are really only two new features: Internet Explorer 5 (IE5) and Internet Connection Sharing (ICS).

To date, more than 45 million copies of Windows 98 have been sold. Windows 98 Second Edition is not expected to sell quite so many copies.

Windows 98 Service Pack 1

Since its release, Microsoft has continually tested and released updates for Windows 98. Just months after the Windows 98 launch, Microsoft began testing fixes for the platform and in August 1998 released a multimedia update. This consisted of updated versions of a variety of multimedia applications. It was not labelled as a service pack, even though Microsoft later acknowledged that the release had originally been positioned and tested as a service pack.

Microsoft finally succumbed to public pressure in June and released a compilation of updates labelled 'Windows 98 Service Pack 1'. The service pack consists of the Windows 98 System Update, Internet Explorer 4.01 Service Pack 2, Windows 98 Year 2000 Update, Windows 98 Year 2000 Update 2, and Outlook Express Year 2000 Update.

The IE4 update is useless for those who have updated to IE5. The Windows 98 System Update includes an Active Accessibility update, a USB update, networking updates and several other fixes. It would be nice to think that Windows 98 was designed to be Y2K-proof, but if Microsoft feels it necessary to release year 2000 updates, it is probably a good idea to install them.

There are two options for installing Windows 98 Service Pack 1. The first is to go to Microsoft's Windows Update Web site (http://windowsupdate.microsoft.com/) and download some or all of the components. The second is to request the service pack on CD from Microsoft. There is a $US5 shipping and handling fee for the CD. The idea of being charged for updates to software that was incomplete in the first place has annoyed a lot of users.

The service pack provides a number of useful updates for all Windows 98 users, so everyone should try to install it. For most users, however, there is no reason to consider purchasing Windows 98 Second Edition, even though the new release has some benefits.

Windows 98 Second Edition

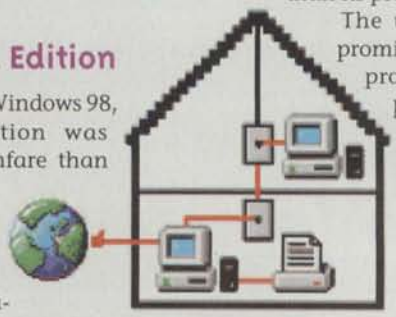
One year after the release of Windows 98, Windows 98 Second Edition was released with much less fanfare than the original.

All new PCs will be bundled with the latest release of the operating system, and the shrink-wrapped distribution is available in shops for about $300 for the full package, or about $160 if you are upgrading from Windows 95. You can also purchase the upgrade CD for $13.95 from Microsoft's Web site (http://www.microsoft.com/australia/buyit/windows/).

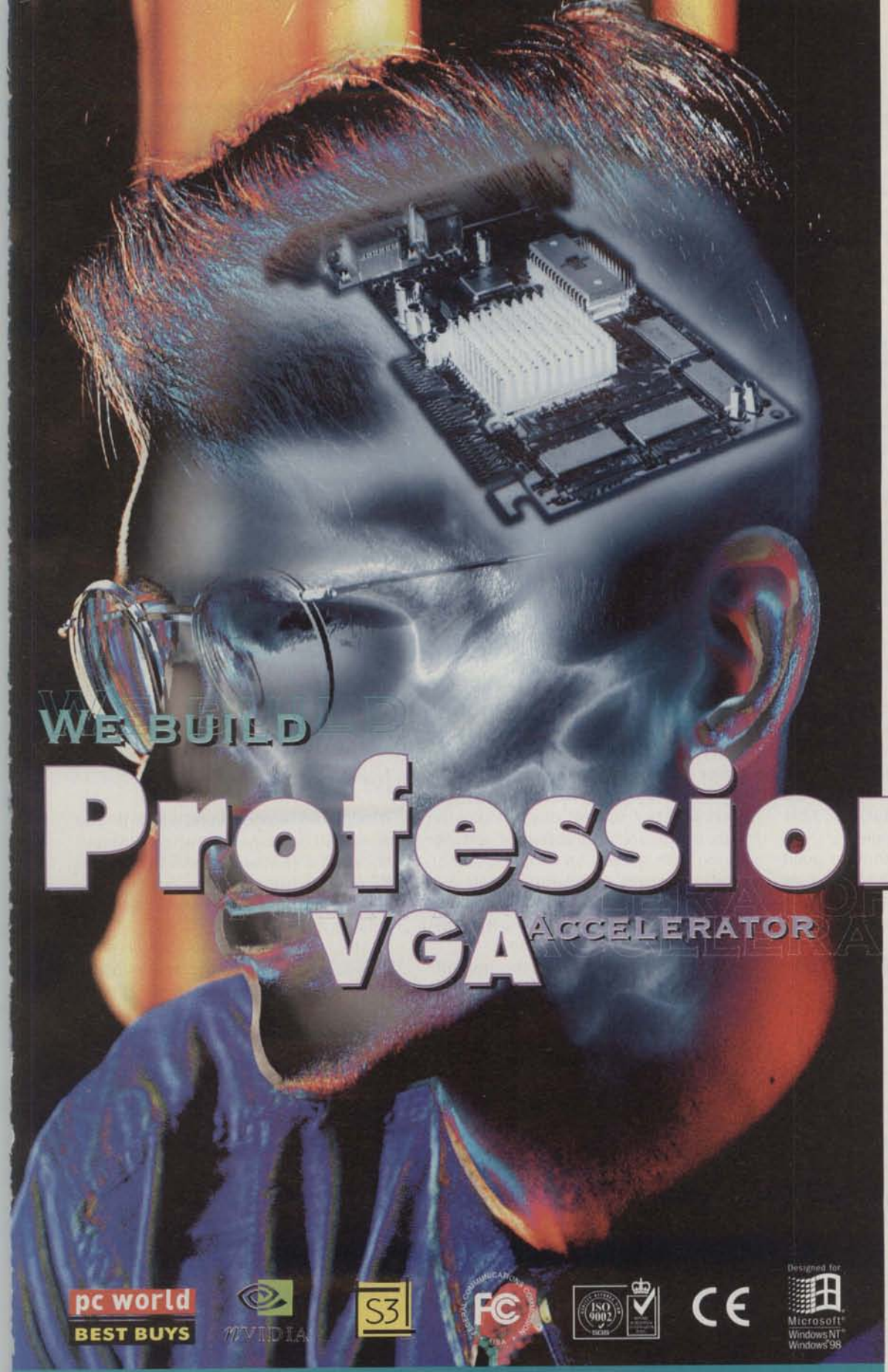
In addition to receiving the updated code, Windows 98 users who order Windows 98 Second Edition will receive *Windows 98 and the Internet*, a book detailing the new features and benefits of Windows 98 Second Edition for Internet use.

The core improvements of the Second Edition consist of expanded support for Internet and home networking technologies that have not yet been widely adopted. The Internet Connection Sharing feature allows multiple computers to share one Internet connection. It is the company's first step toward its goal of driving the widespread adoption of home networking. We will discuss this feature in more depth later.

Browsing through the material on Microsoft's Web site reveals that the target of this release is not current owners of Windows 98, but those who have yet to upgrade from Windows 95. Microsoft is enticing Windows 95 users who were afraid of any possible bugs in the new OS (they're all supposed to be fixed now), and is providing additional features users would not have received with the standard version of Windows 98. Microsoft also claims that Windows 98 Second Edition is more stable than its predecessor.



The upgrade procedure promises to be much less problematic. This was perhaps the most common complaint when Windows 98 was released. It was soon made known that the easiest and safest way to install Windows 98 was to



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back up your data, format the hard drive and start completely afresh. This time-consuming procedure should not be necessary with the Second Edition.

After Microsoft's pronouncements about greater stability, it was ironic to hear that only one week after its release, Windows 98 Second Edition had a bug in it. The bug causes the system to hang if it is suspended, and the user is forced to reboot. Microsoft has since published a workaround for the problem on its Web site. (Microsoft was probably hoping that a service pack for the Second Edition wouldn't be needed for at least six months.)

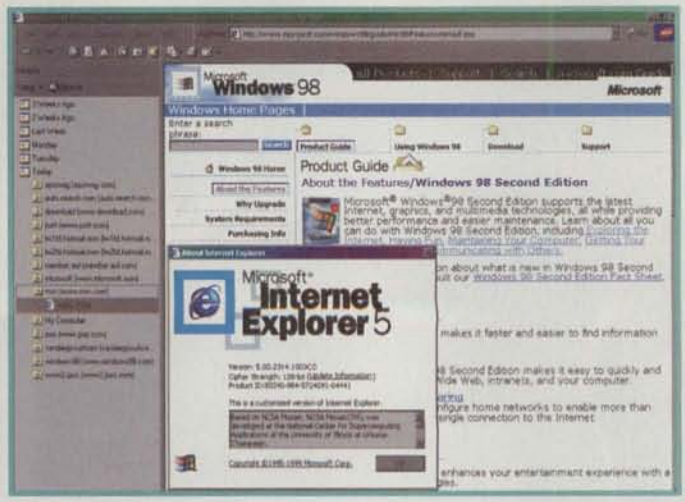
New features

The Internet Connection Sharing feature is being touted as the biggest selling point of the Windows 98 update, but there are a few other features you may be interested in.

IE5 is the operating system's browser. Windows NetMeeting 3.0 makes Internet conferencing easier and offers enhanced performance, security and support for Internet standards. There is also improved support for Universal Serial Bus, IEEE 1394 and ACPI hardware technologies.

You probably already know a good deal about IE5, so let's look at the new Internet Connection Sharing feature. It allows you to create a home network where more than one PC or computer device can share the same Internet connection. All of your computers can be online simultaneously, viewing different sites without incurring the cost of additional phone lines. Computers not running Windows 98 can also be connected and will support file and printer sharing, as well as fun things like multiplayer gaming.

Internet Connection Sharing uses DHCP (Dynamic Host Configuration Protocol), a server technology that automates manual tasks while setting up a home network.



The number of households with at least one computer is increasing dramatically. Combined with the increasing need for Internet access, the Internet Connection Sharing feature will prove very useful for many.

Though Internet Connection Sharing may sound like a brilliant new technology, there are other applications that perform a similar function. WinGate is one such program, and we remember using it a year or so ago to allow two computers in a study to use the same Internet connection. After several days of playing with hardware and software settings (along with quite a lot of hair pulling), WinGate would successfully do its job. The convenience of WinGate is brilliant, but the stress involved in setting it up prevents many people from using it.

If you have postponed the upgrade from Windows 95 to Windows 98 this long, there is no longer any reason to prolong the changeover.

Remember FAT32? Implementing a more efficient file allocation table can free up a lot of hard drive space and is a pretty good reason for Windows 95 users to upgrade to Windows 98. The Quick Launch toolbar is another addition that many Windows 98 users find extremely useful.

What does the future hold for Windows?

Windows 98 Second Edition is to be the last of the DOS-based operating systems. Microsoft is shifting its focus to Windows NT and the first consumer version (codenamed Neptune) will be available in two to three years.

Meanwhile, the software giant is pushing businesses to buy its current Windows NT family of products. Windows NT is still the more stable operating system, and the most expensive. At the time of writing, Windows 2000 was scheduled for release by the end of this year. ■

Windows 98 shareware

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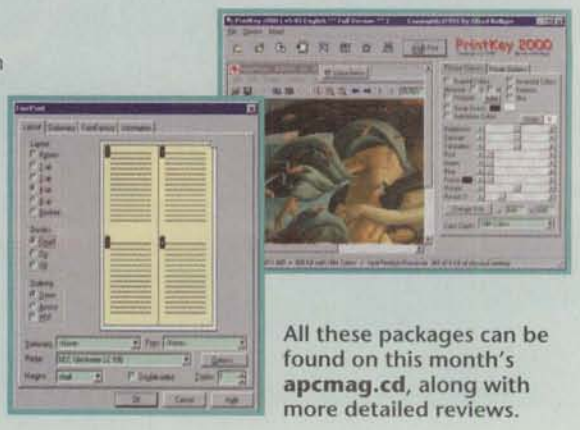

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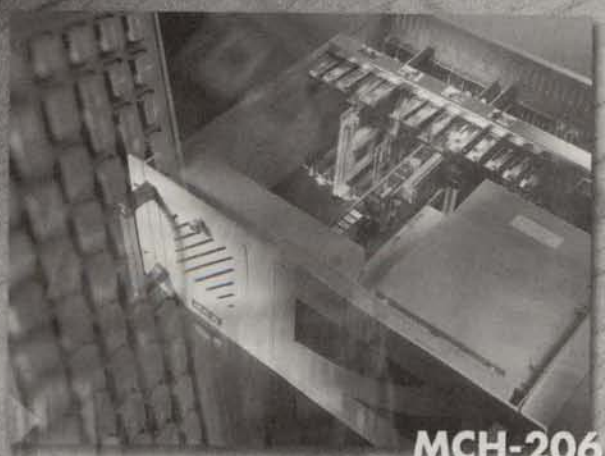

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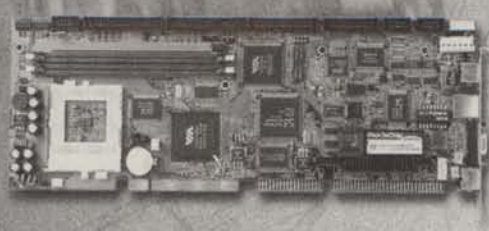

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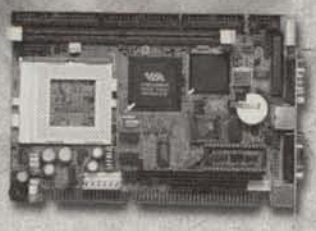

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Creating PDF files the Presentation Manager way. **By Christopher Relf**

OS/2 Warp

If you were initially excited by last month's task of PDF creation, but ended up feeling somewhat disappointed and frustrated, get excited again. This month we look at PDF creation using the Presentation Manager.

PDF creation, method two

You can print to a PostScript printer with a script quietly running in the background to intercept the data stream before it reaches the PostScript printer, and automatically fly into action to create the PDF file.

Three files are required for this more elegant operation. You can download them from an OS/2 file archive such as http://www.os2.com/, but they are also included on this month's **apcmag.cd**.

VREXX2.ZIP

Visual REXX/2 (VREXX/2) is an extension to the already popular OS/2 programming language, REXX. VREXX/2 adds a PM interface to REXX, so your input and output can be directed to REXX scripts using dialog boxes, drag and drop, and other general WPS extensions.

To install VREXX/2, simply unzip the compressed archive file to a folder, and then edit your CONFIG.SYS PATH and LIBPATH statements, adding the path to the folder where you installed VREXX/2.

PRINTMON.ZIP

The Print Monitor is the program that actually intercepts the printer output and redirects it for you. It doesn't do any of the PDF creation or conversion, but is an important step along the way. Unzip Printmon to a folder of your choice, and again edit your CONFIG.SYS PATH statement to include the path to the folder where you just installed Printmon. Next, so as not to corrupt any of the physical printer ports on your system, set your PostScript printer driver to send to printer, but ensure the LPT port you choose does not actually exist.

DISTILL.ZIP

This archive contains the REXX conversion script that calls GhostScript to do all of the work. Unzip Distill and once again edit your CONFIG.SYS PATH statement to include Distill's path. You're not quite off the hook yet — you need to edit DISTILL.CMD to match your system. Using a text-only editor (OS/2's native System Editor is safe), make the following changes.

On line 39, alter the path following gsdir= to the path where you installed GhostScript. Because GhostScript is compiled across several platforms, and the OS/2 version of the compiled executable is GSOS2.EXE, you will need to either rename GSOS2.EXE to GS.EXE, or change GS in line 96 of DISTILL.CMD to gsos2. It is probably better to do the latter, especially if you already use GhostScript for other things. Thus, the line should look like: gsos2 -q -dNOPAUSE -dBATCH -sDEVICE#pdfwrite and so on.

If you have Adobe Acrobat Reader installed on your system, you now need to edit DISTILL.CMD with the path to the Reader, so that Distill can automatically open the file to view.

Getting it all going

You will need to start Printmon whenever you want to capture the PostScript data. A tip from the README.TXT file — rather than launching Printmon every time you print a file, try creating a file STARTUP.CMD in the root directory of your boot drive. Using a pure text editor, add the line: START /MIN PRINTMON LPT*x* "DISTILL STDIN" to the file, where *x* is the output port that you defined earlier. If STARTUP.CMD already exists in your root directory, just add that line to the end of it.

Try it out

Despite the work needed to set things up, this method of PDF file creation is likely to be the easiest for most people. If you're so inclined, have a look at the Distill VREXX/2 program, and alter it to your needs. Happy publishing!

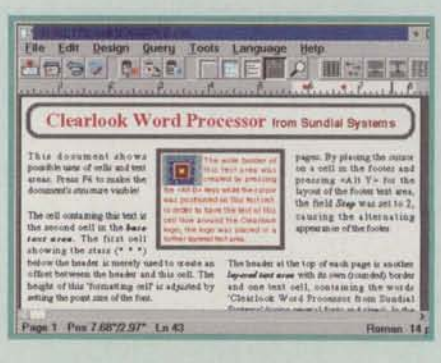
Deja

Deja's ongoing survey of operating systems rates features, performance, ease of use and cost/benefit. At the time of writing OS/2 was ranked first, narrowly ahead of BeOS and Linux. Check out the survey results at http://www.deja.com/.

OS/2 shareware

Clearlook 1.71 for OS/2

Clearlook documents are structured into independent cells, making it easy to create documents with footers, headers, insets and so on. OS/2 integration is absolutely superb, and it has a very small footprint.



DeScribe 5.0

DeScribe is better than ever. It's highly configurable and now has great documentation. Its menus and toolbars are idiosyncratic and take a little getting used to, so you'll probably want to customise them.

These packages can be found on this month's apcmag.cd, along with more detailed reviews.

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APC 99

Current Mac notebooks allow you to take it all with you, but some preparation is necessary. **By Stephen Withers**

Mac OS

Apple's latest PowerBooks are true desktop replacements for many users. But once you decide to make the switch, you then need to transfer your existing files. There are several ways to do this and each has advantages and disadvantages. Some of these tips are also applicable when moving between desktop Macs, or to an iBook.

Applications and extensions

It is strongly recommend that you do a fresh installation of any software you want on the PowerBook. This may take a little longer, but ensures you have a clean copy and all the appropriate support files for your new hardware.

Reinstallion presents no problem if the software is supplied on a CD, but if it comes on floppies, you might have a problem. Like the iMac, the new PowerBooks and iBooks do not have floppy drives.

If you own a CD-R drive, you could burn one or more disks containing the installation files for the floppy-based software you're going install on the new computer. (Of course you'll be using the software on the PowerBook *instead* of — not as well as — on your old computer unless that's permitted under the licence.) This approach is convenient if you ever have to reinstall the software, and makes it easy to carry the installation files when you're travelling. Follow the instructions provided with the drive's software, but you will almost certainly have to copy the floppies to your hard disk (see below) and then onto the CD. You should be able to put more than one package on each CD, and it's a good idea to put any relevant updater or patch files on the same CD as the application installer.

The most obvious answer is to buy a floppy drive, but it's not necessarily the best solution. It really depends on how often you think you'll need it. A USB 1.44M drive costs around $180 if you shop around, while an Imation SuperDrive (which reads regular floppies as well as its own 120M disks) costs about twice as much.

A plug-in drive has its place (for example to back up important documents while you're on the road), but it isn't usually essential for software installation. The trick is to use the floppy in your desktop Mac — or your old PowerBook. Create a copy of each of the installation floppies on the hard disk, then copy the files onto the PowerBook.

An inexpensive hub is an easy and convenient way to connect your desktop and notebook systems.

There are two ways to create the copies. First, you can drag the floppy icon onto the hard disk icon to create a new folder on the hard disk. It will have the same name as the floppy and it will contain the files that were in the floppy. Second, you can use the Disk Copy utility that comes with Mac OS (you may have to copy it from the Utilities folder on the CD-ROM containing the system software) to create a disk image file.

Launch Disk Copy and choose Create Image from Disk from the Image menu (or just type Command-I). Insert the floppy and choose a location for the image file in the resulting dialog box. You'll probably want to uncheck the Mount Image option, otherwise the newly created image file will be mounted on the desktop immediately.

Regardless of how you copy the floppies, you need to transfer the files to the PowerBook — we'll discuss this later. Once the files are there, double-click on the image files to mount them on the desktop, then open the icon for the first 'disk' in the set and run the installer. If you copied the folders instead of making image files, make sure all the folders in the set are in the same place (at the root level of a hard disk, or all within the same folder), then run the installer from the first folder.

Don't forget to apply any appropriate updates or patches after you've installed the software on your new computer — this is especially important for antivirus software such as Virex. If you make use of AppleScript you may also need to copy any nonstandard items from your old Scripting Extensions folder.

There was one problem using this method: the 2.0v3 updater for Claris Emailer wouldn't patch our freshly installed copy of 2.0v2, apparently because of the Mac OS 8.6 FOND problem we mentioned last month (*APC* September 1999, page 152). The only workaround was to replace the Emailer application itself with the copy installed on our Power Macintosh. You'll find instructions to fix the cosmetic problem with Emailer menus under Mac OS 8.5 and 8.6 at http://www.xlr8yourmac.com/tips/emailerOS85.html. It involves using ResEdit to replace the Mercutio MDEF (menu definition) resources in Emailer with those from the current version of Mercutio. It's not difficult, and Emailer looks better for it.

SCSI mode

The quickest way to transfer files to your PowerBook is to use its SCSI disk mode. This makes the PowerBook's hard disk appear to be an external hard disk to the Macintosh to which it is connected.

You need either a SCSI disk adaptor cable or a 25-pin SCSI cable and a docking adaptor for the PowerBook's SCSI port. Such an adaptor lets you use a single cable to attach to either a normal SCSI peripheral or to another Mac. A switch on the adaptor lets you choose its operating mode.

Before you start, make sure the other Macintosh does not have a SCSI device set to ID 2 on its (external) bus. The default setting for SCSI disk mode is ID 2, and although the PowerBook SCSI Setup control panel claims to let you change the ID, it doesn't have any effect on the bronze PowerBook G3 (and possibly other models). You may have read that you shouldn't have any other devices on the SCSI chain — we have successfully attached a PowerBook to the end of a chain of two external disks and a scanner, but if you're having problems, temporarily ditch the other devices. You should also make sure no password is set in the PowerBook's Password Security control panel.

Switch off both Macs and all SCSI peripherals, connect them with the aforementioned cable. Make sure the PowerBook is plugged into the mains and turn it on. Instead of the usual

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startup display, a large SCSI icon bounces around the screen. If it doesn't, you probably used the wrong cable or didn't set the adaptor switch correctly. Now start up the other Mac, and the PowerBook's drive will be mounted on the desktop and you can copy files to it in the usual way.

When you've finished, remember to switch off the computers and peripherals before disconnecting the cables.

Network connection

Using a network connection between the two computers is most convenient. While it is slower (by a factor of four in our tests) than SCSI disk mode when transferring large amounts of data, the convenience of having both computers active is a big plus. For example, you can install a program, check that it is working properly, then move the old preference file across and check again.

You will probably use Ethernet, as it is standard on most recent Macintoshes. A crossover cable can be used to connect two machines, or you can go through a hub. Certain models allow you to communicate using the infra-red ports, eliminating cables altogether. Infra-red is slower than Ethernet, but could save time when you're only transferring a few small files. You'll need to select the interface you're using in the AppleTalk control panel.

Once the two computers are connected, activate File Sharing (either from the Control Strip or in the File Sharing control panel) on one and connect to it from the Chooser on the other. It doesn't really matter how you do it. It's probably more natural to have the destination as the server, but you might prefer the opposite. Don't forget to turn off File Sharing once you've finished, both for security and to save CPU cycles.

External drives

It's possible to use an external drive (floppy, hard, Zip, Jaz or whatever) to move files between computers, but it isn't particularly convenient. You may have to copy the files twice — once onto the external drive and again onto the PowerBook. If there isn't enough space on the drive to move all the files at once, or you forget some, it's a nuisance to keep switching the drive from one computer to another (unless it is a USB device, of course).

A SuperDisk drive lets you read and write to 1.44M floppies as well as its own 120M disks.

Internet settings

Very little Internet setup is necessary. For a dialup connection, open the TCP/IP control panel, set it to connect via PPP, configure using PPP server, and type in the name server addresses and the search domains. It's a good idea to check that the Modem control panel is set to the internal modem — it probably is, but it doesn't hurt to be sure. On the old computer, export your Remote Access configuration(s), copy the resulting file(s) to the PowerBook, and import the configuration(s). Select the one you want, and that's all you should need to do.

It's worth transferring the Internet Preferences file (in the Preferences subfolder of the System Folder) and the preferences and other files for your mail client and newsreader, but apart from that it's best to start from scratch. Unless you are exceptionally organised, your bookmarks and so on are probably a mess, so consider starting with a clean slate.

Decor

The default highlight colour in Mac OS 8.6 does not produce good contrast on a PowerBook display. Under most conditions, it's almost indistinguishable from white. Open the Appearance control panel, click the Appearance tab, and choose a different colour. The standard shades are all too pastel for our liking, so select Other and choose another colour. Using the RGB Picker, 100% red, 50% green and 83% blue gives a shade of purple that's light enough to give reasonable contrast with black text, but dark enough to stand out against a white background. If this is not to your taste, experiment until you find something suitable. You may also find that your favourite desktop picture doesn't look as attractive on an LCD as it does on a CRT, in which case another decorative change is necessary.■

Mac shareware

DragThing 2.7
An application and document launcher which remains unobtrusive while maintaining full functionality. Launching docks can store URLs and background processes can be shown.

Default Folder 3.0.3
Default Folder provides Standard File (Open/Save) dialog functions similar to those of the Mac OS 8.5 Navigation Services, and adds some of its own.

BeHierarchic 4.0.1
Adds levels of hierarchical submenus to the Apple menu, permits grouping and reordering of Apple menu items, and enables the font for its menus to be specified.

Snitch 2.6.2
Snitch provides enhancements to the Finder's Get Info box, including the ability to change file type and creator codes, and to edit or view file properties.

ColorSwitch Pro 1.2.2
This utility allows groups of functions to be switched in unison, which mimics Location Manager, and adds display settings to the list of switchable items.

AliasMenu 2.1
AliasMenu allows you to add custom menus to the Mac menu bar to launch applications, documents and control panels.

All these packages can be found on this month's apcmag.cd, along with more detailed reviews.

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A free SQL database is included with most Linux distributions — here's how to put it to work. **By Geoffrey Bennett**

Linux

PostgreSQL is a free open source database system that can run on Linux. It has most of the features available in commercial databases, such as transactions, triggers, and locking, as well as a few of its own, such as user-defined types and multi-version concurrency control.

Transaction support allows you to combine multiple database updates so that all transactions complete, or if one transaction fails, none of them complete. This is important if, for example, you are creating a bank database. When you transfer money between accounts, two transactions must take place — money must be withdrawn from one account and deposited in another. In case something unexpected prevents the completion of this process, you need to be able to undo the transaction, otherwise money would be lost. Transaction support ensures that either both parts of the transaction complete or neither part completes.

Triggers let you define an action to be carried out when an operation is performed on the database. For example, if you are using an inventory database, you may want the inventory count to update when you enter order information. You can use a trigger so that when you enter the order details, the trigger updates the inventory automatically.

Locking is essential for a multiuser database. It prevents data being lost if different users attempt to modify the same data at the same time.

Most databases only support a certain number of data types, such as numbers, strings, dates, and Booleans. PostgresSQL lets you define your own data types. For example, a number of geometric types — such as points, lines, and circles — have already been added to PostgresSQL, and you can perform queries on these just as easily as with regular types.

Multiversion concurrency control (MVCC) is another advanced feature of PostgresSQL. MVCC prevents data from being lost by keeping track of the different versions of data when multiple users are working with the same data. To perform a backup of an entire database, you would usually need to prevent any modifications at all during that time, otherwise inconsistent data could be backed up. MVCC allows the backup process to capture the database when it starts running, while allowing other processes to make changes to the data which won't be visible to the backup process.

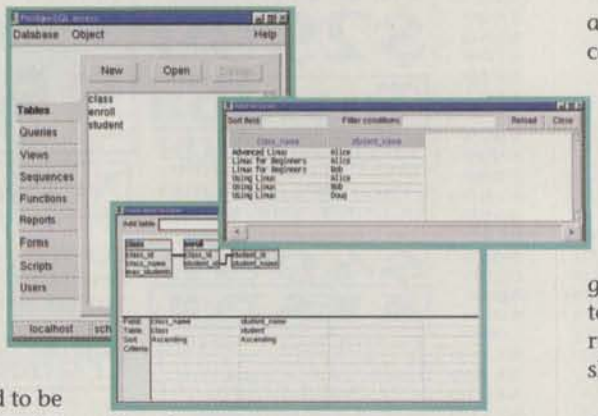


Figure 1

ODBC

Open Database Connectivity (ODBC) allows you to write an application that requires a database, without tying it to any particular database server. Any database server with an ODBC driver can then be used with your application.

Since PostgresSQL has an ODBC driver, you can run your database on a Linux server and your database interface on a Windows client. ODBC is supported by many applications and development environments/languages under Windows, including Microsoft's Access, Excel, Visual Basic and Visual C++, and Inprise's Delphi.

PostgresSQL clients

Under Linux, PostgresSQL clients can be written in a number of languages, including C, C++, Perl, Tcl, Python, Emacs Lisp, PHP3, and Java (using JDBC). There is also a command-line SQL client (psql) and a graphical SQL client (pgaccess). The Applixware for Linux Office Suite's Data module also supports PostgresSQL. The screenshots above show pgaccess in action with a sample 'school' database.

Installing and initialising

Most modern Linux distributions include PostgreSQL, so installing it is just a matter of installing the relevant package. Once you've done that, try starting the PostgresSQL 'postmaster' by running (as root) /etc/rc.d/init.d/postgresql start or /etc/init.d/postgresql start.

The postmaster should run all the time, as it is responsible for handling communication between front-end processes and the back-end database. If the postmaster is not running, clients will not be able to connect to the database. If, when starting the postmaster, you get an error message that the database system cannot be found, you'll need to run initdb to create some skeleton files that PostgresSQL needs to start with. You only need to do this once for a system. You should run initdb as the postgres user (which should have been created at installation).

As root, you can run su - postgres to switch to the PostgresSQL user, which then initialises the database system:

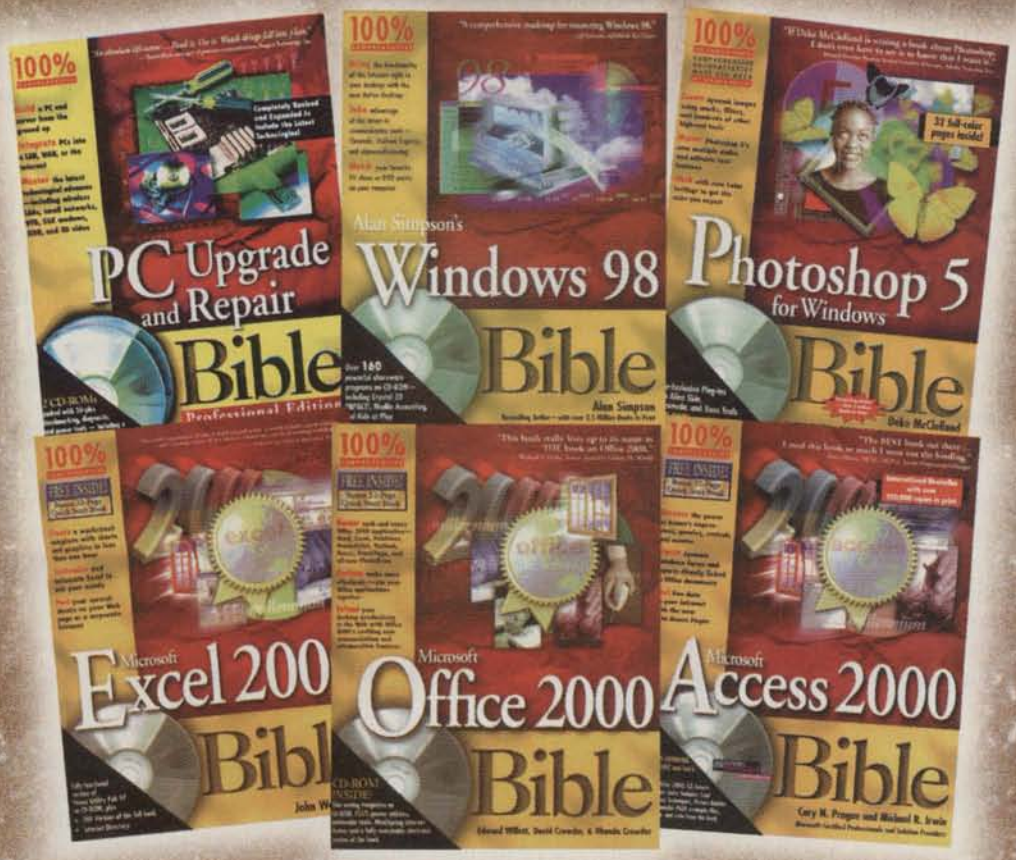
```
initdb —pglib=/usr/lib/pgsql —
pgdata=/var/lib/pgsql
```

The —pglib switch specifies where the PostgresSQL data files that it needs are located, and —pgdata specifies where the database is to be created. The —pgdata location should match the directory name in the error given by the postmaster.

Once the database system has been initialised, you need to authorise a local user to be able to connect to the database. This is done using the createuser command, and by default only the PostgresSQL user is able to create new users who can access the database. If my Linux username is geoffrey, I'd create a PostgresSQL user called geoffrey by typing createuser geoffrey. When you are prompted for a PostgresSQL ID, use the default value. You'll also be asked whether the user should be allowed to create databases and add users — if you answer 'yes', you won't need to log back in to the PostgresSQL account later to do these operations.

After creating the PostgresSQL user, you can log out from the PostgresSQL account and back into your regular account. The final step before you can actually use PostgresSQL is to create a database. This is a separate step from initialising the database system because PostgresSQL supports

There is a God.



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multiple databases on the same installation. For example, type createdb test to create a database named 'test'.

Using the psql client

To start psql, type psql followed by the database name or, if you have a database with the same name as your username, psql will default to that.

The psql prompt is => preceded by the database name. At this point you can type any valid SQL command, which will be sent to the database back end for execution, and the results will be displayed onscreen. You can type an SQL command over multiple lines — psql will retain everything you type up until you finish the command with a semicolon (;). If you haven't yet finished a command, the psql prompt will change to ->.

To create the miniature 'school' database in figure 1, I started by creating the 'class' table, which stores information about each class in the school:

```
CREATE TABLE class (
 class_id    VARCHAR(5) PRIMARY KEY,
 class_name  VARCHAR(80),
 max_students INT
);
```

Note that SQL doesn't differentiate between upper and lower-case. It also doesn't matter if you type the above statement all on one line — it would still work, but would be harder to read.

The two data types used in the class table are VARCHAR, which is used to store variable-length strings up to the limit specified, and INT, which is used to store integers.

The words PRIMARY KEY mean that the data value must be unique; no two classes can have the same class_id, and the database will enforce this restriction.

To place data into a table, you use the INSERT command. So, to add entries for three classes you could type:

```
INSERT INTO class VALUES ('L101', 'Linux
        for Beginners', 10);
INSERT INTO class VALUES ('L102', 'Using
        Linux', 10);
INSERT INTO class VALUES ('L103',
        'Advanced Linux', 5);
```

To verify the data in a table, you can use the SELECT command. To show all the data in the class table, type SELECT * FROM class. If you only want particular fields, you could type SELECT class_name, max_students FROM class.

Now that you have some classes, you also need some students, but first you should create a sequence number generator, which will give us an easy way to assign a unique ID number to each student:

```
CREATE SEQUENCE student_id_seq;
```

Here's a table to keep track of students:

```
CREATE TABLE student (
 student_id   INT PRIMARY KEY DEFAULT
nextval('student_id_seq'),
 student_name VARCHAR(80)
);
```

Note how student_id has a default value, which will be the next number from the student_id_seq sequence. To use this default value, you use a form of the INSERT command and specify some of the fields:

```
INSERT INTO student (student_name)
        VALUES ('Alice');
INSERT INTO student (student_name)
        VALUES ('Bob');
INSERT INTO student (student_name)
        VALUES ('Doug');
```

Now if you view the data in the table you can see that student_id has been automatically assigned a value:

```
school=> select * from student;
student_id        student_name
1        Alice
2        Bob
3        Doug
```

Finally, you need some way to match up students and classes. This can be done with an 'enrol' table like this:

```
CREATE TABLE enrol (
 class_id   VARCHAR(5),
 student_id INT
);
```

To enrol Alice in the 'Linux for Beginners' class, you could type:

```
INSERT INTO enrol VALUES ('L101', 1);
```

Now that the school's enrolment information is in a database, you can view the data in all sorts of ways. To get a list of all classes and students sorted by class then student, you could enter:

```
SELECT class.class_name, student
        .student_name
FROM class, enrol, student
WHERE class.class_id = enrol.class_id
AND enrol.student_id = student.student_id
ORDER BY class_name, student_name;
```

Or to find out how many people are enrolled in class L102, you could enter:

```
SELECT count(*)
FROM enrol
WHERE class_id = 'L102';
```

To learn more about what you can do using SQL, see 'Resources' below.

Resources

The PostgreSQL Web site can be found at http://www.postgresql.org/.

HTML documentation should be included with your PostgresSQL installation, so you can view the entire PostgresSQL manual online.

An SQL tutorial is available at http://w3.one.net/~jhoffman/sqltut.htm.

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Taking an abstract view of your data.

By Michael Smith

Simple C++

Generally, C++ programs are written to solve real world problems. These problems may be confined to simple data types, integers, real numbers, characters and so on, but all too often they are not. An abstract data type (ADT) attempts to represent a real world problem (or part thereof) in a computer problem. One of the simplest ways you can do this is using a struct.

```
struct complex_t {
  double real;
  double imag;
};
```

An abstract data type is defined to represent a complex number with a real component and an imaginary one. You can then declare a variable of that type and access it as follows:

```
complex_t c, *pc;

c.real = 1.3;
c.imag = 4.6;

pc = new complex_t;
*pc = c;

(*pc).real = 5.3;
```

The new operator works with complex_t just as it does for a built-in type, such as int. The members of the struct are accessed using the '.' operator. When accessing the members of the struct pointed to by pc, the parentheses are needed. Otherwise the compiler will interpret it as *(pc.real), which is illegal. The special case of a pointer to a structure is so common that a shorthand notation is provided. So, (*pc).real = 5.3; is exactly equivalent to pc->real = 5.3;.

An interesting feature of structs is that they can be *self-referential*.

```
struct node_t {
  int data;
  node_t *next;
};
```

The definition of a struct can contain a pointer to a struct of its own type, as shown in the example above.

This can be useful to build linked lists. Each node contains a pointer to the next node, and the last node will point to NULL. The program stack.cpp (on **apcmag.cd**) is a linked list implementation of a simple stack. The stack supports two operations: push() and pop().

In the push() function (listing 1), a new node is allocated and inserted at the beginning of the list, while in the pop() function (listing 2) the front node (the most recently added) is removed from the list.

Breaking up is hard to do

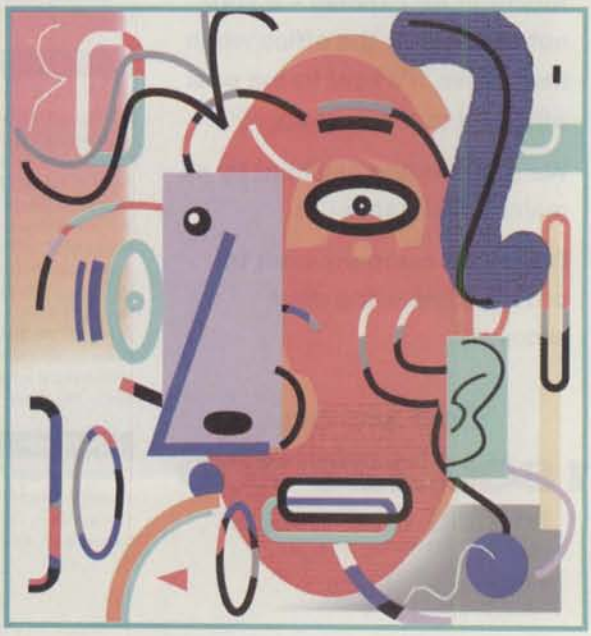
Until now, each of the programs has been contained in just one file. In bigger projects this is impractical. First, if the source file becomes too large, compile times become very long. Second, you often want to reuse components. If, for example, you develop a stack management system for your latest project, then you may want to use that for future projects. By keeping the source in a separate file you can reuse the code more easily.

Perhaps the most important reason is the simplification of projects. If you can move all code and data related to a particular part of a project into a separate file, you can manage that part of the project in isolation. You can separate the stack code into a separate file or module, and the stack code is simple enough to be managed. Managing the project does not require management of the internals of the stack module, only the management of its interface. This interface will normally be published in a header file. Any part of the project which uses the stack module can include the header file and it has enough information to use the stack module.

Listing 3 is an example of a header file for a stack management module. Splitting a program into manageable modules, known as *modularity*, is the first step to encapsulation, or information hiding.

If you define a set of interface functions in the stack management module, the rest of the program doesn't need to know how it is implemented. As long as they know the interface, they can use the module. This has an interesting benefit. When other parts of the program know about the internal structure of the stack module, programmers may write code which relies on that structure. If it becomes necessary (or even desirable) to change that structure at a later date, you will probably cause problems throughout the program. By hiding that structure, this problem is prevented, therefore making the program simpler and more robust.

Listing 3 hides the interface of the stack management module somewhat, but it still publishes the definition of the node_t struct. In listing 4 we go one step further by



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C++ source code

Listing 1

```
int push( node_t * &stack,
          int data )
{
  node_t *n=new node_t;

  if (n==NULL)
    return 0;

  n->data = data;
  n->next = stack;
  stack = n;

  return 1;
}
```

Listing 2

```
int pop( node_t *& stack )
{
  node_t *n;
  int data;

  if (stack==NULL)
    return ERRVAL;

  n = stack;
  stack = n->next;
  data = n->data;
  delete n;
  return data;
}
```

Listing 3: stackman.h

```
struct node_t {
  int data;
  node_t *next;
};

node_t *stack_create(void);
int stack_push(
        node_t *& stack,
        int data );
int stack_pop(
      node_t *& stack );
void stack_destroy(
      node_t *& stack );
```

Listing 4: stackman.h (improved)

```
typedef void *stack_t;

stack_t stack_create( void
  );
int stack_push(
  stack_t& stack, int data );
int stack_pop(
  stack_t& stack );
void stack_destroy(
  stack_t& stack );
```

Listing 5: main.cpp

```
#include <iostream>
#include "stackman.h"

int main()
{
  const int NVALS=5;
  int i;
  int datavals[NVALS] =
     { 1, 2, 3, 4, 5 };
  stack_t st =
     stack_create();

  for (i=0; i<NVALS; i++)
    stack_push( st,
            datavals[i] );

  for (i=0; i<NVALS; i++)
    std::cout
     << stack_pop( st )
     << '\n';

  stack_destroy( st );

  return 0;
}
```

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declaring the stack_t as a void pointer. The outside world now needs (and gets) no knowledge of how the stack was implemented. You can change the implementation at will, and as long as the interface isn't altered, you can be confident that programs that use the stack management module will not notice the change.

Listing 5 shows main.cpp, an example main program which uses the stack management module from stackman .cpp. You can compile and link them fairly easily:

GNU compiler
gxx main.cpp stackman.cpp –o main.exe
Microsoft Visual C++ 5 or 6
cl –GX main.cpp stackman.cpp
Borland C++ 3
bcc main.cpp stackman.cpp

This month's excursion into encapsulation is a rudimentary example of object-oriented programming. Next month we'll discuss classes, the building blocks of object-oriented programs. Until then, keep on coding.■

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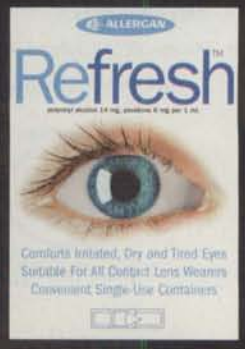

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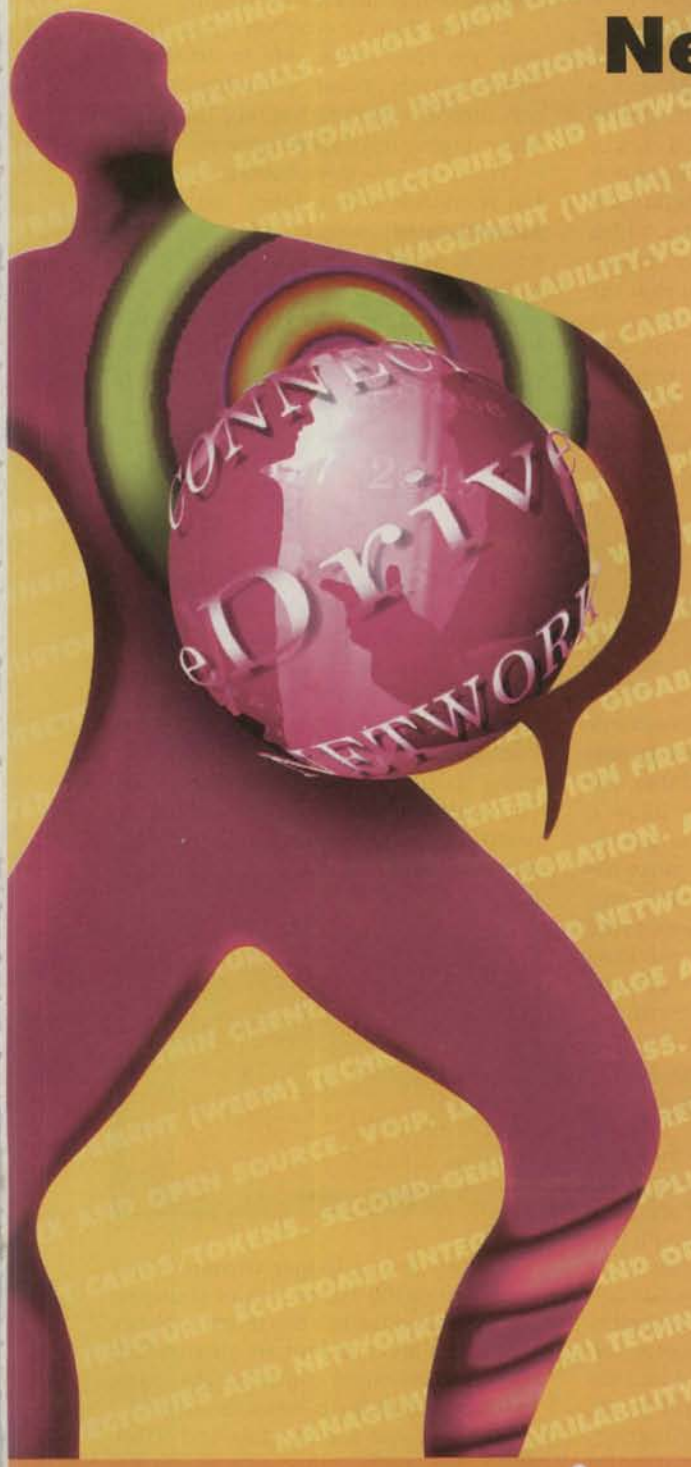

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Using buttons in Java.

By David Williams

Java

Over past months, you've been learning how to write applets to run in Web browsers. This column has looked at events and event handlers, and how Java responds to actions by users. This month you'll start working with graphical components, beginning with the humble button.

Java is visually oriented and thus provides a Button object, more precisely, java.awt.Button. Just as you can work with fundamental data types like integers, characters and floating-point numbers, we can work with buttons, text boxes and all sorts of user-interface objects.

What is a button? It is a graphical push-button with a textual label. All the OKs, Cancels and Applys that are scattered throughout the software you use are buttons.

The Java Development Kit (JDK) provides all the source code to the standard Java classes, and as you become more bold or curious when programming Java, it becomes increasingly helpful to delve into the source code to see just what makes things tick.

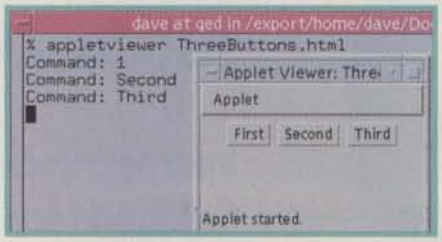
You can find a file called SRC.ZIP in the top-level directory within JDK. If this is unpacked, you can follow the directory path java\awt to find the file Button.java. This is the real Java code needed to implement the Button object.

JBuilder allows you to drill down into the source code for any object by typing a reference to the object in the editor pane and then Ctrl-clicking on it. This brings up a new editor window with the source code for the object. This process can then be followed over and over to delve as deeply into every nook and cranny. Undoubtedly, the Java classes source code for other development environments will also become available through various means.

You can see that the Button object has two constructors or two main ways to create a Button object. They are public Button() and public Button (String label).

If no label is specified, the button will be blank. The label can be changed by a call to setLabel (String label) and retrieved at any time using String getLabel ().

The object has some other interesting methods, such as addActionListener to associate an event handler with a click of the button, which is necessary if the button is to do anything. setActionCommand sets the action command of the button, which is the same as the button label by default. The action command is a string that the event handler can query to determine which object generated the event. The action string for a button can be retrieved using String getActionCommand ().



Separating the label and action command means that more than one button in a class can have the same label. For example, a single display may allow a user to select an input and an output file for some sort of processing. To make file section easier for the user, a 'browse' button may be supplied for both input and output. Two buttons with the same label could exist, but clearly they would perform different functions when clicked.

A button can also perform a toggle function such as Start and Stop. In this case, the label changes, but the same button is clicked.

Listing 1 is a sample applet that contains one button. Whenever this applet is executed by the applet viewer, it will print 'Button pushed' each time the button is activated with the mouse. The HTML file to display the applet is shown below listing 1.

The applet implements the ActionListener interface so that it is capable of receiving events. The button is created and the add() method is used to attach it to the applet. The button's addActionListener() method is called to add the applet to the list of listeners of events from the button. As the applet is now a registered listener of button actions, the method actionPerformed() will be called for every button event. This method simply displays a text string.

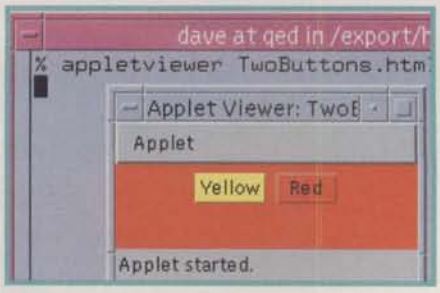
If more than one button exists, however, we need to be able to determine which one was pressed. Consider listing 2, an example with three buttons. The HTML file to display it is shown below the listing.

There are now three buttons. Each button is created with a label, has its add ActionListener() method called to add the applet to its list of listeners, and is attached to the applet with the add() method. The actionPerformed() method is called for each button event, and prints out the action command string. A mouse-click on each of the buttons, in turn, generates this text:

```
Command: 1
Command: Second
Command: Third
```

The button labelled "First" had its command string changed with a call to setActionCommand(). The other two buttons use their labels as the string.

Notice that in the actionPerformed() method we queried the event.getActionCommand() method. This returned the string that was displayed on the screen. You could also have easily performed different processing dependant on the string returned, such as calling a variety of different functions.



Listing 3 is a longer example that incorporates the button colour-changing program from the last two months. Notice how two individual buttons are handled, each has changing captions. The corresponding HTML file is below listing 3.

As usual, the source, class and HTML files for the programming examples in this column can be found on **apcmag.cd**.

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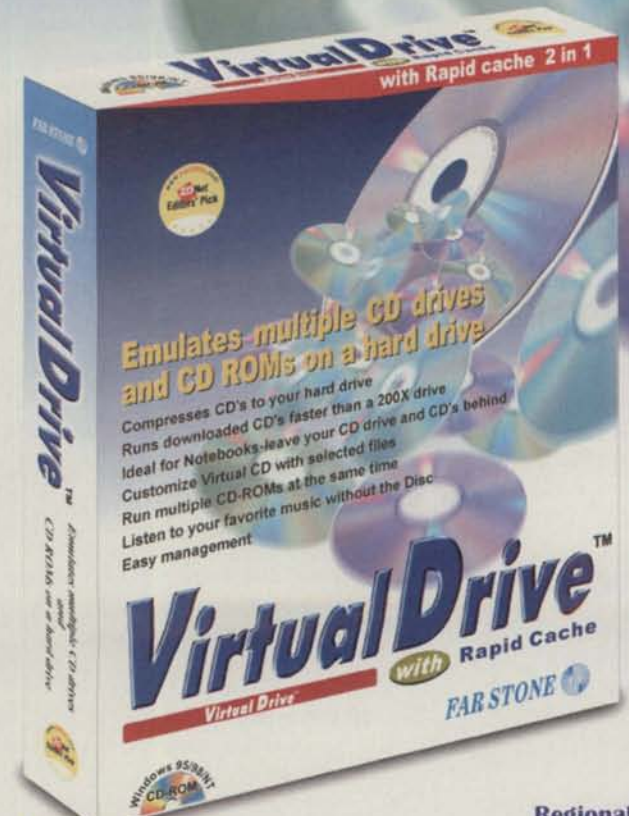

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Java source code

Listing 1: One button applet

```
import java.awt.*;
import java.awt.event.*;
import java.applet.*;

public class SimpleButton
extends Applet implements
ActionListener {
public void init () {
Button button = new
Button ("Push me");
add (button);
button.addActionLis
tener (this);
}

public void actionPerformed
(ActionEvent event) {
System.out.println
("Button pushed");
}
}
```

One-button applet HTML

```
<HTML><HEAD><TITLE>Applet
test</TITLE></HEAD>
<BODY><APPLET
CODE="SimpleButton
.class" WIDTH="200"
HEIGHT="200"></APPLET>
</BODY></HTML>
```

Listing 2: Three-button applet

```
import java.awt.*;
import java.awt.event.*;
import java.applet.*;

public class ThreeButtons
extends Applet implements
ActionListener {
public void init () {
Button button;
button = new Button
("First");
button.setActionCommand
("1");
button.addActionListener
(this);
add (button);
button = new Button
("Second");
button.addActionListener
(this);
add (button);
button = new Button
("Third");
button.addActionListener
(this);
add (button);
}

public void actionPerformed
(ActionEvent event) {
System.out.println
("Command: " +
event.getActionCommand ());
}
}
```

Three-button applet HTML

```
<HTML><HEAD><TITLE>Applet
test</TITLE></HEAD>
<BODY><APPLET
CODE="ThreeButtons
.class" WIDTH="200"
HEIGHT="200"></APPLET>
</BODY></HTML>
```

Listing 3: Colour changes

```
import java.awt.*;
import java.awt.event.*;
import java.applet.*;

public class TwoButtons
extends Applet implements
ActionListener {
private Button btn
private Button btnBGround;

private String[] str
Colours =
{ "White", "Yellow",
"Green", "Pink" };
private Color[]
clColours =
{ Color.white, Color.yellow,
Color.green, Color.pink };
private int colIndex;

private String[] strBGround
=
{ "Gray", "Blue",
"Green", "Red" };
private Color[] clB
Ground =
{ Color.lightGray,
Color.blue,
Color.green,
Color.red };
private int bgIndex;

public void init () {
colIndex = 0;
bgIndex = 0;
btnColour = new Button (
strColours [colInd
ex]);
btnColour.setBack
ground (clColours
[colIndex]);
btnColour.setActionCommand
("Colour");

btnColour.addActionListener
(this);
add (btnColour);
setBackground (clBGround
[bgIndex]);
btnBGround = new Button
(strBGround [bgIndex]);

btnBGround.setActionCommand
("BGround");

btnBGround.addActionListener
(this);
add (btnBGround);
}

public void actionPerformed
(ActionEvent event) {
String cmd =
event.getAtionCommand
();
if (cmd.equals (btn
Colour.getActionCommand ()))
DoColour ();
else if (cmd.equals
(btnBGround.getAction
Command ()))
DoBGround ();
}

void DoColour () {
if (++colIndex >= str
Colours.length)
colIndex = 0;
btnColour.setLabel
(strColours [colIndex]);
btnColour.setBackground
(clColours
[colIndex]);
}

void DoBGround () {
if (++bgIndex >=
strBGround.length)
bgIndex = 0;
btnBGround.setLabel
(strBGround [bgIndex]);
setBackground (clBGround
[bgIndex]);
}
}
```

Colour changes HTML

```
<HTML><HEAD><TITLE>Applet
test</TITLE></HEAD><BODY><APPLET
CODE="TwoButtons.class"
WIDTH="200"
EIGHT="200"></APPLET></BODY></HTML>
```

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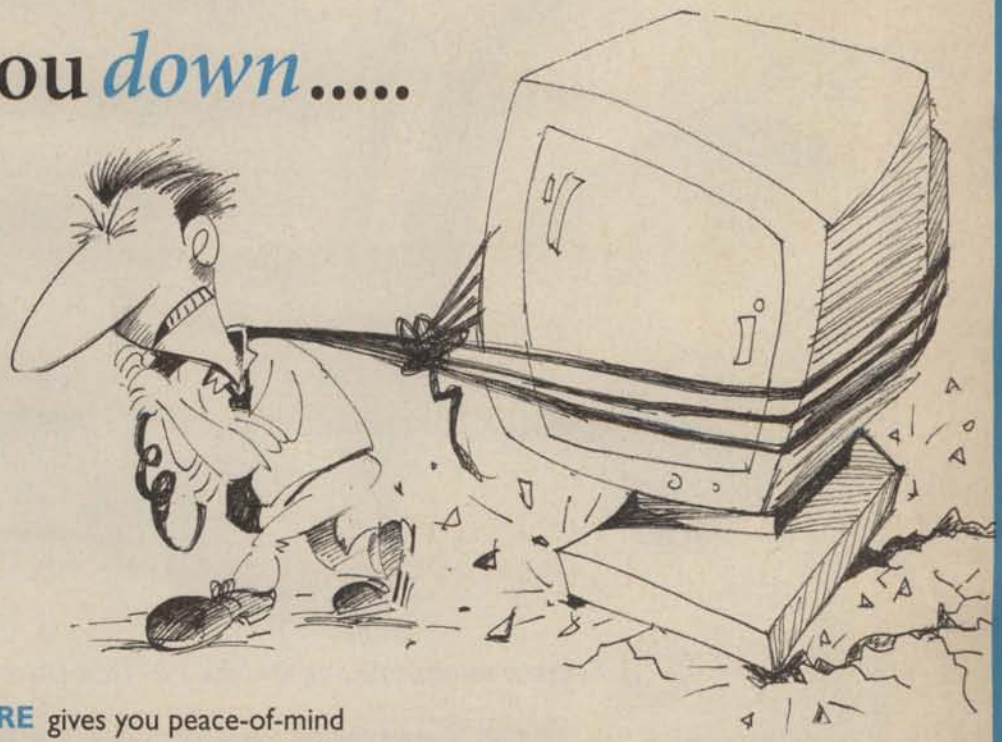

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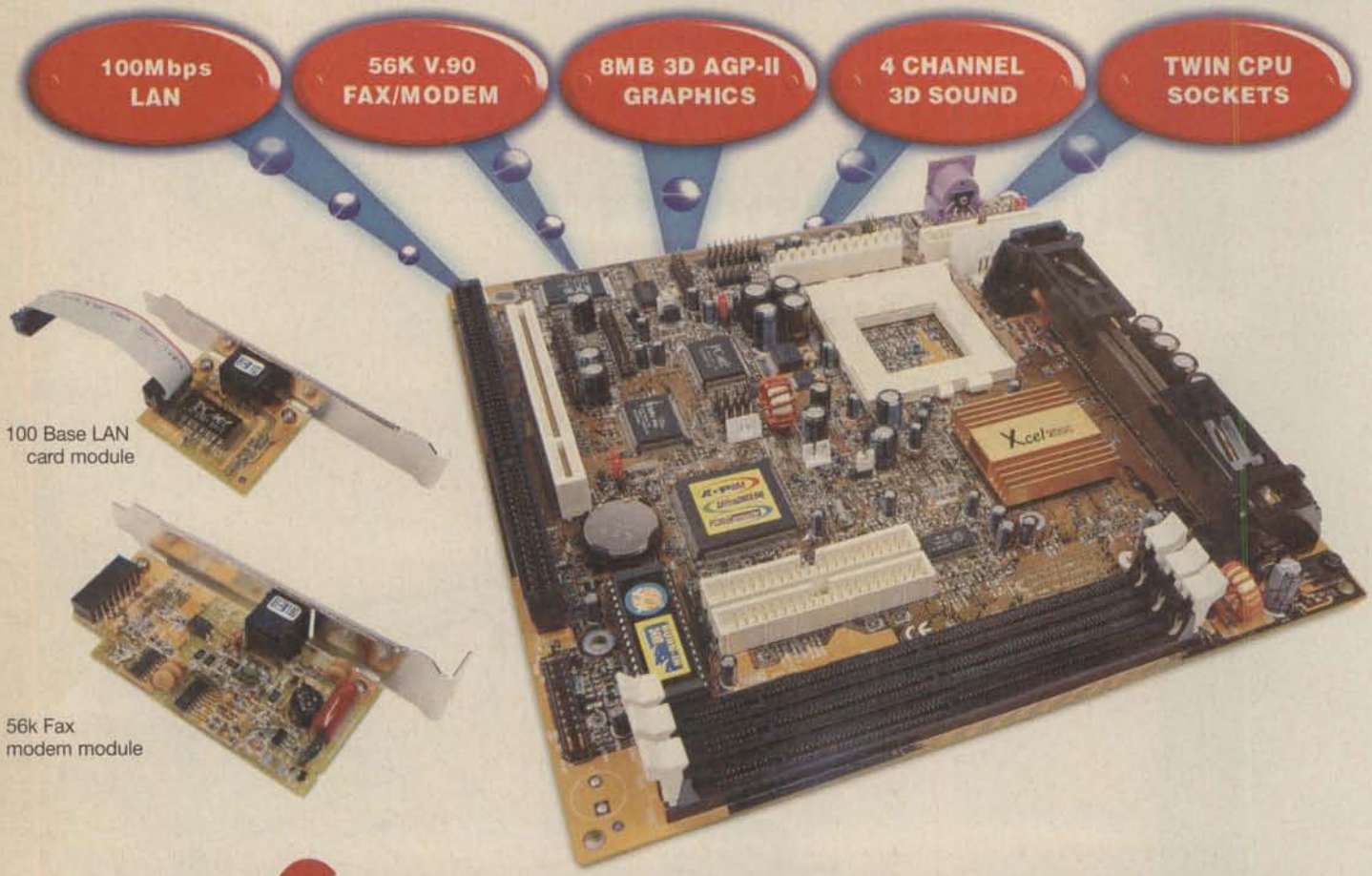

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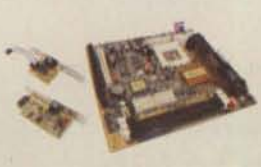
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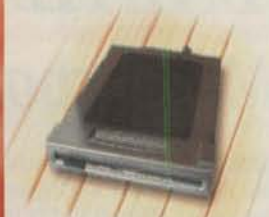

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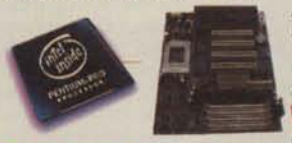

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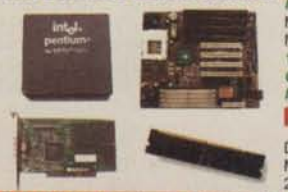

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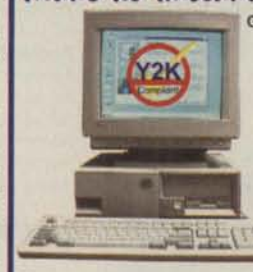

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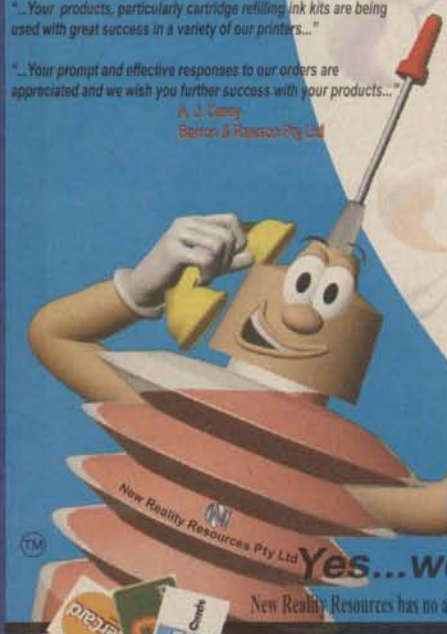

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IMPROVE the EFFICIENCY or PROFESSIONALISM of any ordinary TELEPHONE LINE

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BC-01	BJ-10, BJ-20, BJ StarWriter	Black	FC01	49.35	42.20	48.35	41.20
BC-02	BJ-200, BJC210/210SP/240	Black	FC08	49.35	42.20	48.35	41.20
BC-03	BJC-210SP	Black	FC29	49.35	42.20	48.35	41.20
BC-05	BJC-210/210SP/240	Tri-colour	FC23	58.30	49.85	57.15	48.70
BC-06	BJC-240 Photo Realism	Photo Real	FC28	58.30	49.85	57.15	48.70
BC-06KIT	BJC-240 (BC-06, Bx/Ppr)	Photo	FC30	71.75	61.35	70.35	59.95
BC-09F	BJC-210/210SP/240	Fluorescent	FC24	80.75	69.05	79.15	67.45
BC-10	BJ-30/70/80/S-Writ 300/350c	Black	FC18	67.25	57.50	65.95	56.20
BC-11e	BJC-70/80,m S-Writ Jet 350c	Colour	FC20	76.25	65.20	74.75	63.70
BC-13BK	BJC6000	Black	FC43	26.90	23.00	26.40	22.50
BC-13C	BJC6000	Cyan	FC44	17.95	15.35	17.55	14.95
BC-13M	BJC6000	Magenta	FC45	17.95	15.35	17.55	14.95
BC-13PBK	BJC6000	Black	FC47	17.95	15.35	17.55	14.95
BC-13PC	BJC6000	Cyan	FC48	17.95	15.35	17.55	14.95
BC-13PM	BJC6000	Magenta	FC49	17.95	15.35	17.55	14.95
BC-13Y	BJC6000	Yellow	FC46	17.95	15.35	17.55	14.95
BC-20	BJC4000 series, BJC- 5500	Black	FC14	58.30	49.85	57.15	48.70
BC-21E	BJC4000 , BJC-5500(BC-21)	Colour	FC15	80.75	69.05	79.15	67.45
BC-22E	BJC4200/4300/4550/4650	Colour	FC25	80.75	69.05	79.15	67.45
BC-22EKIT	BJC4200/4300/4550/4650	Colour	FC26	98.70	84.40	96.75	82.45
BC23	BJC5000	Black	FC38	58.30	49.85	57.15	48.70
BC-29F	BJC4000 Series, BJC-5500	Fluorescent	FC27	80.75	69.05	79.15	67.45
BC-30	BJC6000	Black	FC40	80.75	69.05	79.15	67.45
BC-31	BJC6000	Colour	FC41	80.75	69.05	79.15	67.45
BC-32	BJC6000	Photo	FC42	89.70	76.70	87.95	74.95
BC-60	BJC7000 Series	Black	FC31	80.75	69.05	79.15	67.45
BC-61	BJC7000 Series	Colour	FC32	80.75	69.05	79.15	67.45
BC-62	BJC7000 Series	Photo	FC33	89.70	76.70	87.95	74.95
BCI-10BK	As per BC-10 (3 Pack)	Black	FC19	26.90	23.00	26.40	22.50
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BCI-11C	As per BC-11e (3 Pack)	Colour	FC22	34.10	29.15	33.40	28.45
BCI-21BK	BJC4000 series, BJC-5500	Black	FC16	15.20	13.00	14.90	12.70
BCI-21C	BJC4000 series, BJC-5500	Colour	FC17	33.20	28.40	32.50	27.70
BCI-61	BJC7000 Series	Colour	FC34	51.10	43.70	50.10	42.70
BCI-62	BJC7000 Series	Photo	FC37	61.00	52.15	59.80	50.95
BJI-101	BN Notebook & NoteJet Ser.	Black	FC13	14.35	12.25	14.10	12.00
BJI-201B-HC	BJC600 Series (High Cap.)	Black	FC04H	26.90	23.00	26.40	22.50
BJI-201C	BJC600 Series	Cyan	FC05C	14.35	12.25	14.10	12.00
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BJI-201Y	BJC600 Series	Yellow	FC05Y	14.35	12.25	14.10	12.00
BJI-481	BJ130	Black	FC02	36.80	31.45	36.05	30.70
BJI-642	BJ300, BJ330	Black	FC03	31.40	26.85	30.80	26.25
BJI-643BK	BJC800/880 Series	Black	FC11	44.85	38.35	43.95	37.45
BJI-643C	BJC800/880 Series	Cyan	FC12C	53.80	46.00	52.75	44.95
BJI-643M	BJC800/880 Series	Magenta	FC12M	53.80	46.00	52.75	44.95
BJI-643Y	BJC800/880 Series	Yellow	FC12Y	53.80	46.00	52.75	44.95
BJI-801	BJ80	Black	FC10	40.35	34.50	39.55	33.70
BP-30	BN Series Notebook	Black	FC13P	73.00	62.40	71.60	61.00
BX2	B320/340/360 Fax Cartridges	Black	FC35	38.90	33.25	38.15	32.50
BX3	B100 Fax Cartridges	Black	FC36	61.20	52.30	60.00	51.10

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1361760	Lexmark CJ2030-50/3000 Photo	Photo	FL14	80.15	68.55	78.55	66.95
1380479	Lexmark 4070/4702	Black	FL17	36.50	31.20	35.80	30.50
1380490	Lexmark Jetprinter 4079	Black	FL07	48.65	41.60	47.70	40.65
1380492	Lexmark Jetprinter 4079	Magenta	FL09	66.40	58.50	67.05	57.15
1380493	Lexmark Jetprinter 4079	Yellow	FL10	68.40	58.50	67.05	57.15
1380497	Lexmark Jetprinter 4079	Cyan	FL08	68.40	58.50	67.05	57.15
1380619	Lexmark 1000-20/2030-50/3000	Colour	FL02	65.10	55.65	63.85	54.40
1382050	Lexmark CJ2070	Black	FL03	71.45	61.10	70.05	59.70
1382060	Lexmark CJ2070	Colour	FL04	80.00	68.40	78.45	66.85
12A1970	Lexmark CJ5000/5700/7-7200	Black	FL12	57.00	48.75	55.90	47.65
12A1980	Lexmark CJ5000/5700/7-7200	Colour	FL13	69.95	59.80	68.60	58.45
12A1990	Lexmark CJ5000/5700/7-7200	Photo	FL15	80.60	68.90	79.05	67.35
13400HC	Waterproof 1000/2030-50/300	Black	FL11	59.30	50.70	58.15	49.55

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S020108	Stylus Color 800/850/1520	Black	FE19	44.65	38.15	43.75	37.25
SO20034	Stylus Color Pro/Pro XL/XL+	Black	FE10	40.05	34.25	39.25	33.45
SO20049	Stylus Color II, IIs, 1500	Tri Clr	FE13	50.35	43.05	49.35	42.05
SO20062	Stylus Color 1500	Black	FE14	74.75	63.90	73.25	62.40
SO20066	Stylus Color Pro XL + Color	Colour	FE17	87.20	74.55	85.50	72.85
SO20089	Stylus Color 400/600/800/1520	Colour	FE18	44.35	37.90	43.50	37.05
SO20093	Stylus Color 400/500/600/700/Ex	Black	FE15	38.60	33.00	37.85	32.25
SO20097	Stylus Color 200/500	Colour	FE16	50.05	42.80	49.05	41.80
SO20110	Stylus Photo/700/Ex 5-Colour	Colour	FE20	39.20	33.50	38.45	32.75
SO20118	Stylus Color 3000	Black	FE22	113.20	96.80	111.00	94.60
SO20122	Stylus Color 3000 Yellow	Yellow	FE25	113.20	96.80	111.00	94.60
SO20126	Stylus Color 3000 Mag	Magenta	FE24	113.20	96.80	111.00	94.60
SO20130	Stylus Color 3000 Cyan	Cyan	FE23	113.20	96.80	111.00	94.60
SO20138	Stylus Color 300	4 Colour	FE21	34.65	29.60	33.95	28.90
SO20187	Stylus Color 440/640/1200	Black	FE26	36.50	31.20	35.80	30.50
SO20189	Stylus Color 740	Black	FE27	46.15	39.45	45.25	38.55
SO20191	Stylus Color 440/640/740	Colour	FE28	43.65	37.30	42.80	36.45
TOO1011	Stylus Color 1200	Black	FE31	45.80	39.15	44.90	38.25
TOO3011	Stylus Color 900	Black	FE29	57.15	48.85	56.00	47.70
TOO5011	Stylus Color 900	Colour	FE30	67.90	58.05	66.60	56.75

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51604A	ThinkJet Plain Paper	Black	FH14	22.20	18.95	21.75	18.50
51625A	DJ400/500Series	Tri-Colour	FH06	59.65	51.00	58.50	49.85
51626A	DJ400/500Series OJ LX/300	Black	FH05	57.90	49.50	56.75	48.35
51626GA	DJ400/500Series OJ LX/300Series	Black	FH05L	35.45	30.30	34.75	29.60
51629A	DeskJet 600 Series & OJ 590/635	Black	FH16	57.90	49.50	56.75	48.35
51629GA	DeskJet 600 Series & OJ 590/635	Black	FH16L	35.45	30.30	34.75	29.60
51633M	DeskJet Portable & 320	Black	FH07A	49.65	42.45	48.70	41.50
51639A	PaintJet XL300	Black	FH08	44.35	37.90	43.50	37.05
51639C	PaintJet XL300	Cyan	FH09C	49.35	42.20	48.40	41.25
51639M	PaintJet XL300	Magenta	FH09M	49.35	42.20	48.40	41.25
51639Y	PaintJet XL300	Yellow	FH09Y	49.35	42.20	48.40	41.25
51640A	DeskJet 1200C	Black	FH12	58.30	49.85	57.15	48.70
51640C	DeskJet 1200C & 1600C	Cyan	FH13C	64.35	55.00	63.10	53.75
51640M	DeskJet 1200C & 1600C	Magenta	FH13M	64.35	55.00	63.10	53.75
51640Y	DeskJet 1200C & 1600C	Yellow	FH13Y	64.35	55.00	63.10	53.75
51641A	DeskJet 850C	Tri Colour	FH18	60.65	51.85	59.45	50.65
51644C	DesignJet 3x / 4x / 7x	Cyan	FH26	65.10	55.65	63.85	54.40
51644M	DesignJet 3x / 4x / 7x	Magenta	FH27	65.10	55.65	63.85	54.40
51644Y	DesignJet 3x / 4x / 7x	Yellow	FH28	65.10	55.65	63.85	54.40
51645A	DJ700/800/1600Series/1120C	Black	FH19	57.90	49.50	56.75	48.35
51645GA	DJ700/800/1600Series/1120C OJ 1150/1170/1175 Low Volume	Black	FH19L	38.65	33.05	37.90	32.30
51649A	DJ600 Series & OJ 590/600	Tri-Colour	FH17	59.65	51.00	58.50	49.85
51650C	DesignJet 650	Cyan	FH20C	67.15	57.40	65.80	56.05
51650M	DesignJet 650	Magenta	FH20M	67.15	57.40	65.80	56.05
51650Y	DeskJet/Deskwriter 650	Yellow	FH20Y	67.15	57.40	65.80	56.05
92261A	ThinkJet Cartridge	Black	FH15	22.20	18.95	21.80	18.55
C1816A	DeskJet 690C Photo Cartridge	Colour	FH21	64.10	54.80	62.85	53.55
C1823D	DJ710/20/890/895/1120/OJ1170	Tri Colour	FH23	64.25	54.95	63.00	53.70
C1823G	DJ710/20C/890/895/1120/OJ1170	Tri Colour	FH23L	47.45	40.55	46.50	39.60
C3844A	Photosmart Star	Orange	FH24	69.10	59.10	67.75	57.75
C4841AA	HP Pro Series 2000C	Cyan	FH33	63.10	53.95	61.85	52.70
C4842AA	HP Pro Series 2000C	Magenta	FH34	63.10	53.95	61.85	52.70
C4843AA	HP Pro Series 2000C	Yellow	FH35	63.10	53.95	61.85	52.70
C4844AA	HP Pro Series 2000C	Black	FH32	63.10	53.95	61.85	52.70
C6615A	HP Deskjet 810/812C	Black	FH36	65.90	56.35	64.60	55.05

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F1L17	HP C3909A,Canon EPW Toner Cartridge	301.00	257.40	291.10	247.50
F1L23	HP 92295A/Canon EPS Toner cartridge	133.45	114.75	129.20	110.50
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RPL15	Lexmark 5770 Photo JetPrinter EPP	654.28	561.60
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D627	Zip 100MB Cartridge Mac format	19.95	17.05	19.50	16.60	18.65	15.75
DDI17	Zip 250MB Cartridge PC format	33.95	29.10	32.60	27.75	31.20	26.35
DDI18	Zip 250MB Cartridge Mac format	33.95	29.10	32.60	27.75	31.20	26.35
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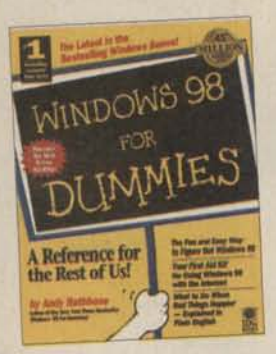

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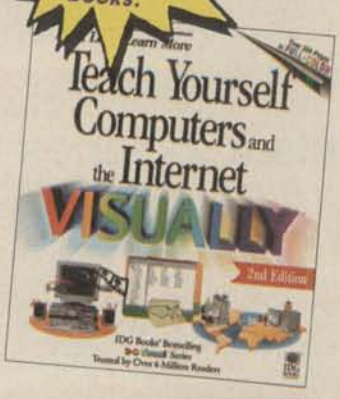

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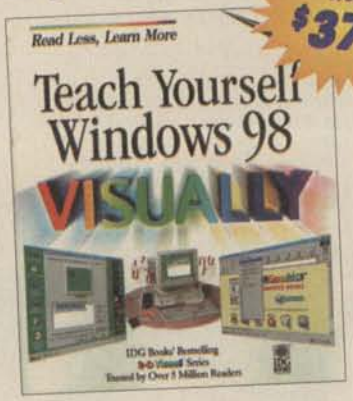

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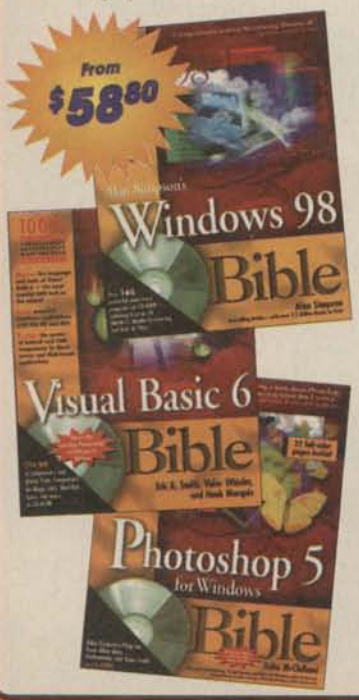

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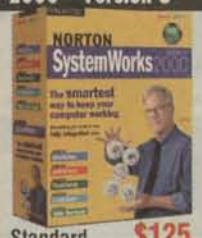

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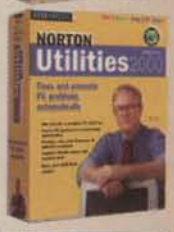

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HP Desk Jet 850C/855C/870C/1000C Series	3x3	30A-CLR
HP Desk Jet 710/720/890 Series	3x3	30B-CLR
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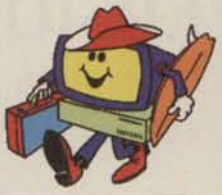

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Intel Celeron 400A/433A ... 154/194
Intel Celeron 466A/271A ... 233/330
AMD K6 2 400/450MMX ... 120/145
AMD K6 3 400MMX ... 241
Pentium III 450 ... 387
Pentium III 500 ... 520
Pentium III 550/600 ... 976/1340

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8/16/32Mb EDO ... 38/65/123
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64MB SDRAM PC100 ... 130
128/256Mb SDRAM PC100..259/614

Monitor $
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15" Samsung 510S/510MS ... 318/384
15" /17" Hansol 500A/701A ... 280/475
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17" Mitsubishi 1772i 0.26 dot ... 553
17" Samsung 710S/710MS ... 583/644
15"/17 "Goldstar 520Si/775N.574/518
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15" NEC V500 ... 353
17" Sony 200ES/GS ... 832/1086
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19" Sony 400 PS ... 1689
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21" NEC 1100/P1150 ... 2280/3162

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Banksia PCMCIA 56K ... 250
Banksia PCMCIA 56K & RJ45 ... 353
Banksia SP 56K OEM ... 198
Banksia SP 56K Retail ... 227
Xicom 56k PCMCIA ... 294
Mitsubishi 56K V90 PCI Int ... 80
Mitsubishi 56K V90&K56flex Ext 140
Netcom 56K Roadster II Retail ... 288
Netcom 56K Roadster II OEM ... 203
Netcom 56K Road II USB oem ... 229
Dynalink 56K PCI Int ... 100
Dynalink 56k Voice Ext ... 163
Xircom 56K PCMCIA Ethernet ... 608
US Robotics 56K Message V90 .254
Netcom 56K PCMCIA & RJ45 ... 365

Joystick / Mouse / KeyBoard $
Logitech Wingman Light ... 48
Logitech Wingman Extreme ... 95
Microsoft Sidewinder Precison ... 126
Microsoft Force Feedback ... 303
Artec 3 Buttons Mouse Serial ... 12
Logitech 3 Buttons PS2.Mouse ... 25
Win95 Mitsubishi Keyboard ... 25
Win98 Keyboard PS2 ... 23
Honeywell Large 104 Seria I/ PS2 .60

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HP 6250C / PhotoScanner ... 909/824
Epson GT7000 ... 381
Patrol 3D Optical 300X600 36 Bit130
Artec AM12E+/AM12S ... 160/220

Printer $
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Epson LQ570+/LQ870 ... 598/897
Epson LQ2070 ... 830
Stylus 440/640 ... 232/298
Stylus 740/850/900 ... 484/659/734
Epson Stylus Photo 700/Ex ... 411/736
Epson 1520/3000 A2 Size1018/3258
HP 695C ... 261
HP 710C ... 326
HP 880C USB Cable ... 540
HP 1120C A3 Size ... 848
HP 1600C ... 2265
HP 1600CM ... 3295
HP Laserjet 1100 ... 768
HP Laserjet 1100A wirh Scan ... 908
HP Colour LaserJet 5/5M 5387/7074
HP LaserJet 4000/T ... 2262/2765
HP LaserJet 4000N/TN ... 2752/3401
HP LJet 5000/N/GN ... 2921/4193/5179
HP LJet 8000/N/DN ... 4764/5285/6143
HP OfficeJet Laser 3100 ... 1411
HP OfficeJet 710C/1170C .954/1427
HP OfficeJet 1175C ... 1794
BJC 50/80 ... 571/331
BJC 265 /4310 ... 145/203
BJC 5000 A3 Size Colour ... 491
BJC 5500 A2 Size ... 1217
BJC 7100 ... 491
Canon LBP 660 Laser ... 492
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System $
AMDK6 II 400/450MMX ... 1532/1577
AMDK6 III 400MMX ... 1669
AMDK6 III 450MMX ... 1719
Intel Celeron 400A/433A ... 1606/1649
Intel Celeron 466A/500A ... 1691/1796
Pentium III 450 ... 1943
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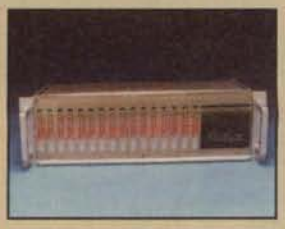

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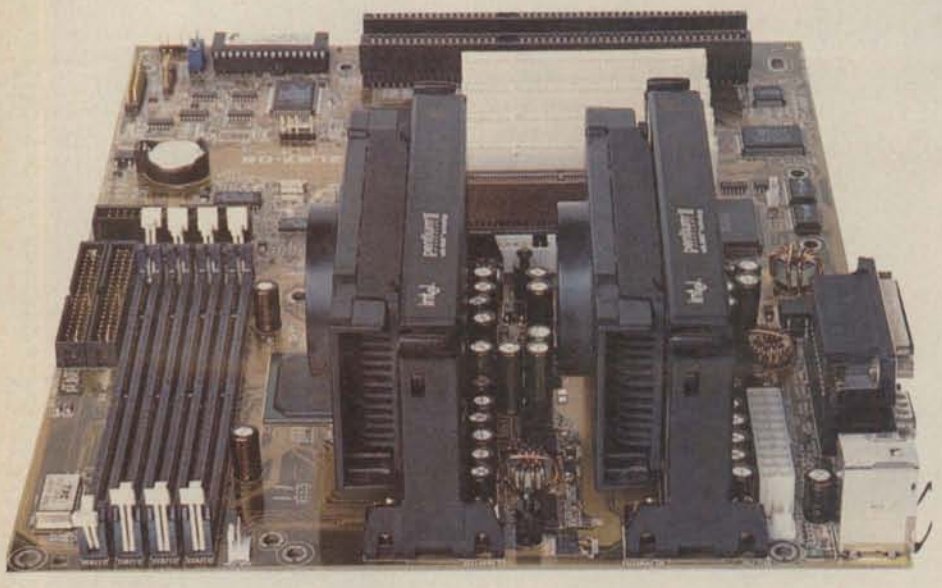

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- Adaptec Ultra2 SCSI on-board
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- Soundblaster PCI128
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October 1999

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- Mouse & Keyboard
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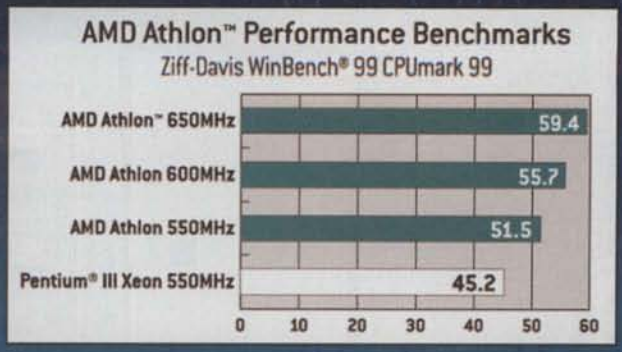

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CPAMD021	AMD Athlon Processor 550Mhz	$1035
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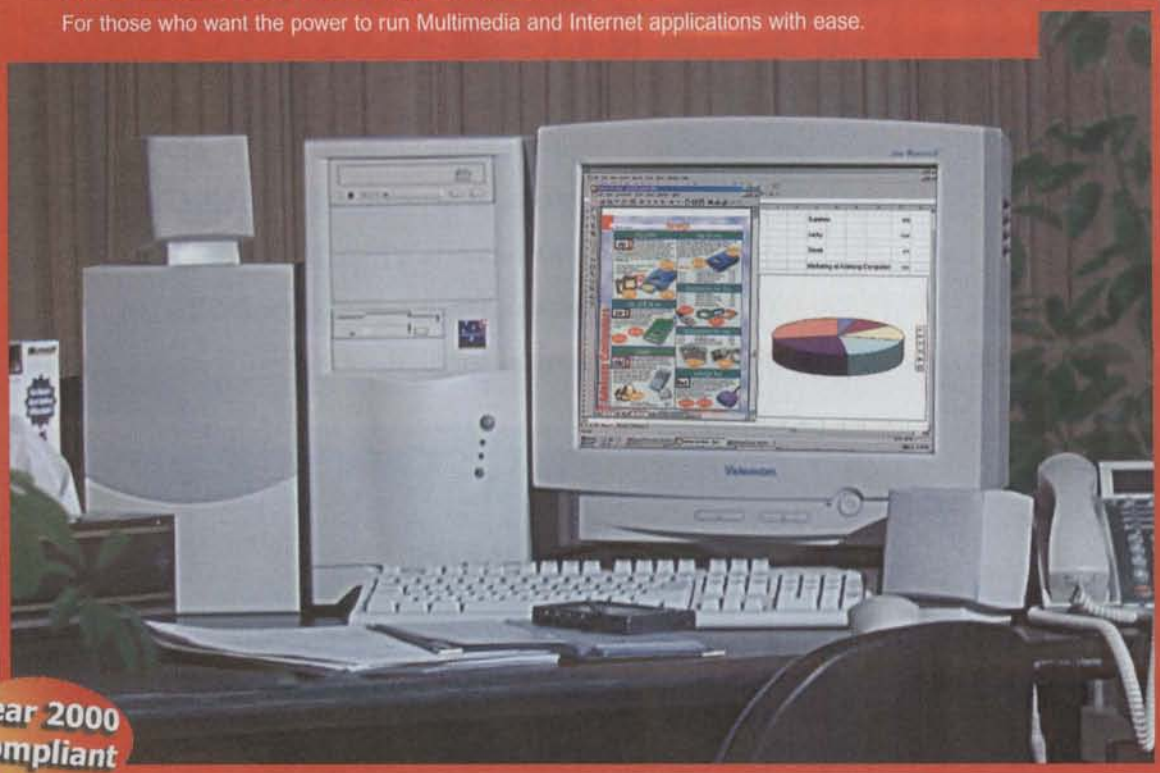

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- Mid Tower Case
- Logitech Wheel Mouse
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- 6X DVD-ROM Drive
- 17" Colour Monitor
- Altec Lansing ACS45.1 Speakers
- Mid Tower Case
- Logitech Wheel Mouse
- Microsoft® Windows 98
- Norton AntiVirus
- 2 Year Limited Warranty

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Intel® Pentium® III Processor 500Mhz

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- 64MB SDRAM
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- 32MB Diamond Viper V770 AGP
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- 6X DVD-ROM Drive
- 17" Colour Monitor
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- Logitech Wheel Mouse
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- 64MB SDRAM
- 13GB Ultra ATA Hard Drive
- 32MB Diamond Viper V770 AGP
- Diamond Monster MX300 Audio
- 6X DVD-ROM Drive
- 17" Colour Monitor
- Altec Lansing ACS45.1 Speakers
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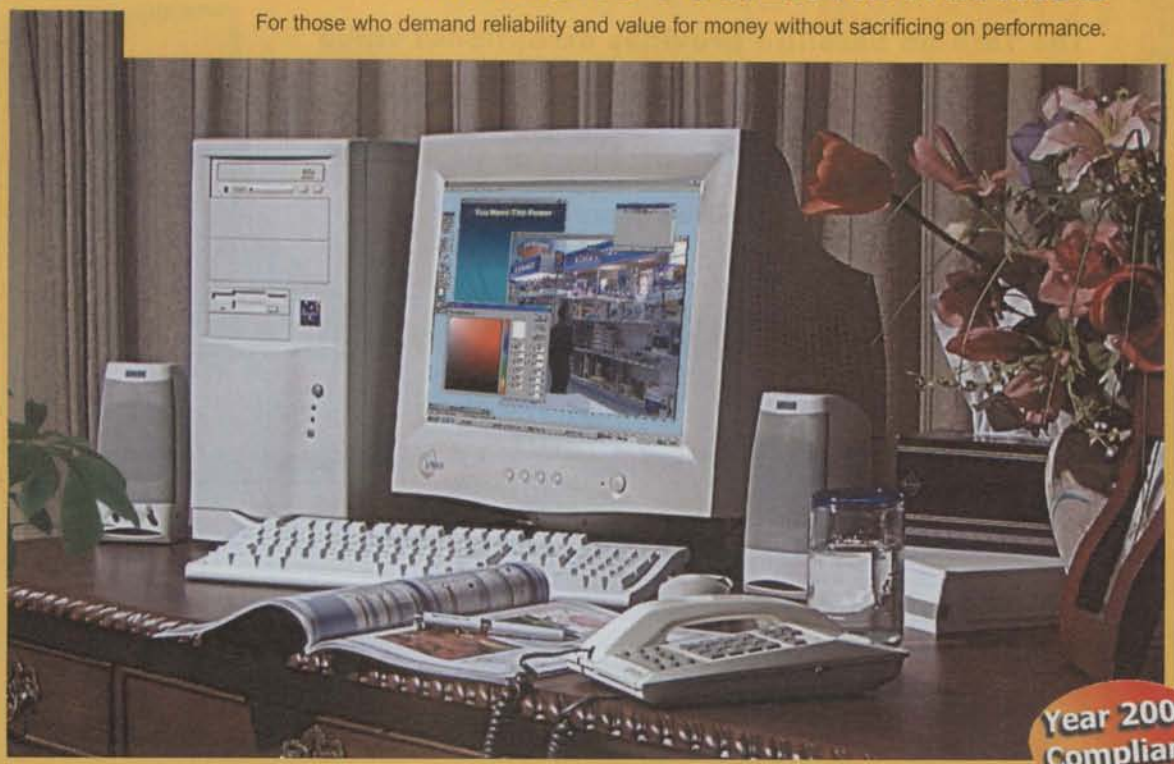

Year 2000 Compliant

Intel® Celeron™ Processor 466Mhz

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- 512KB L2 Cache
- 64MB SDRAM
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- 8MB AGP Graphics Accelerator
- PCI 4-Channel Sound with 256 Voices
- 48X EIDE CD-ROM Drive
- 17" Colour Monitor
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- Mid Tower Case
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Intel® Pentium® III Processor 500Mhz

- 512KB L2 Cache
- 64MB SDRAM
- 10GB Ultra ATA Hard Drive
- 8MB AGP Graphics Accelerator
- PCI 4-Channel Sound with 256 Voices
- 48X EIDE CD-ROM Drive
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- 17" Colour Monitor
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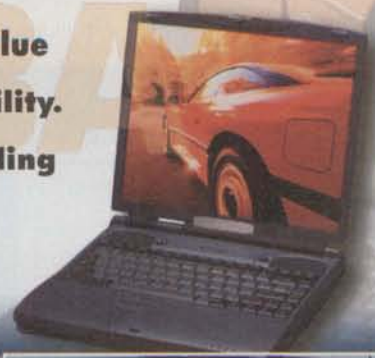

Model	2540CDS	2540CDT	2590XDVD	2590CDT	4050XCDT	4100XDVD
Processor	AMD K6-2 333Mhz	AMD K6-2 333Mhz	Celeron 400Mhz	Celeron 400Mhz	Celeron 400Mhz	Pentium II 400Mhz
RAM	32MB	64MB	64MB	64MB	64MB	64MB
Hard Drive	4GB	4GB	6GB	6GB	4GB	6GB
CD-ROM	24X MAX	24X MAX	DVD	24X MAX	24X MAX	DVD
Display	13" DSTN	14.4" TFT	14.1" TFT	12.1" TFT	14.1" TFT	14.4" TFT
Warranty	1 Year	1 Year	1 Year	1 Year	1 Year	1 Year
O/S	Windows 98	Windows 98	Windows 98	Windows 98	Windows 98	Windows 98
Price Rent	$2699 NBTOS055 or Rentsmart $26.08 per week*	$3445 NBTOS056 or Rentsmart $31.62 per week*	$4565 NBTOS059 or Rentsmart $41.50 per week*	$3925 NBTOS062 or Rentsmart $35.50 per week*	$4345 NBTOS063 or Rentsmart $39.92 per week*	$5735 NBTOS061 or Rentsmart $49.15 per week*

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- Integrated 56K Fax/Modem
- 2 x PCMCIA Type II
- Parallel, Serial and USB connector
- Microsoft Windows 98

ThinkPad i Series	140M	143M	149M
Intel Processor	Mobile Celeron 366Mhz	Mobile Celeron 366Mhz	Mobile Pentium II 366Mhz
Memory(std/max)	32MB/256MB SDRAM	64MB/256MB SDRAM	64MB/256MB SDRAM
Hard Drive	4.8GB	4.8GB	6.4GB
Display	12.1" Active TFT	14.1" Active TFT	14.1" Active TFT
S-Video (TV-out)	-	-	Yes
CD/DVD-ROM	24X MAX CD-ROM	24X MAX CD-ROM	2X DVD-ROM
Weight	3.4kg	3.5kg	3.5kg
Price	$3245 NBIBM017 Rentsmart $29.50 per week*	$3875 NBIBM018 Rentsmart $35.31 per week*	$4945 NBIBM019 Rentsmart $42.50 per week*

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1 Year Warranty

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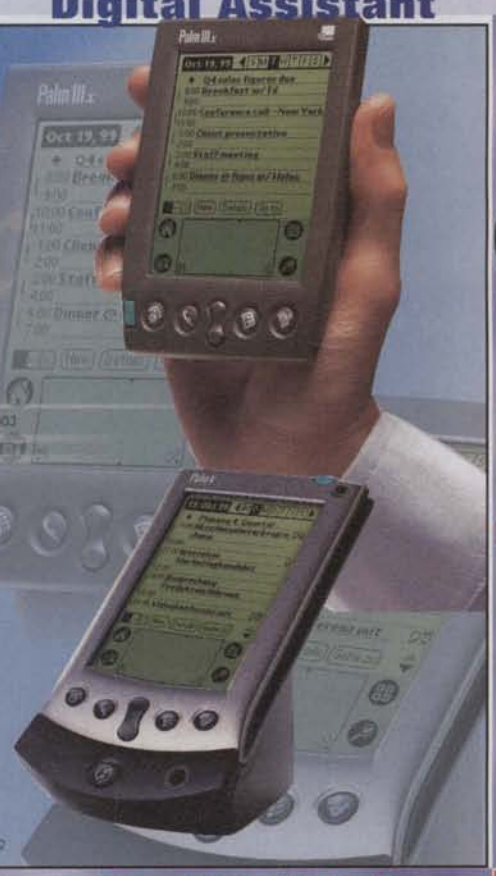

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- Use 2 x AAA battery

$495 PA3CO003

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- 2MB RAM Stores 6000 Addresses, 5 Years of Appointments, 1500 memos and 200 Email Messages
- Lithium-ion battery automatically recharges in HotSync® cradle for up to a month's operation
- Allows Palm OST software upgrades via Internet download.
- TCP/IP Ready for Internet Connectivity with optional modem

Modem for Palm V **$325** PA3CO004

$865 PA3CO002

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Adelong Computers

Processors

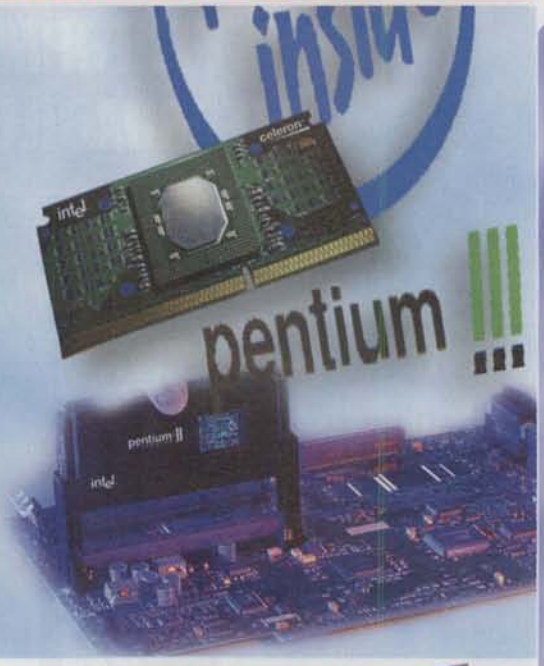
CALL OUR SALES TEAM FOR THE LATEST PRICING ON THESE PRODUCTS

Intel Pentium III Processor

The Pentium III processor extends processing power further by offering performance headroom for business media and Internet capabilities. With Streaming SIMD Extensions - 70 new instructions to speed up Graphics, Multimedia, 3D gaming and Streaming video applications, be ahead with the Pentium III.

NEW

Code	Model	Price
CPINT027	Intel Pentium III 450Mhz	$419
CPINT028	Intel Pentium III 500Mhz	$565
CPINT031	Intel Pentium III 550Mhz	$1075
CPINT033	Intel Pentium III 600Mhz	$1475



Intel Celeron Processor

The Intel Celeron Processor for desktop computing provides you with the performance to handle today's most common applications at an exceptional price. Compatible with Socket 370 PPGA Mainboards.

intel inside celeron

Code	Model	Price
CPINT026	Celeron 400Mhz PPGA	$169
CPINT029	Celeron 433Mhz PPGA	$215
CPINT030	Celeron 466Mhz PPGA	$265
CPINT032	Celeron 500Mhz PPGA	$375

AMD Processors

AMD K6-3

Code	Model	Price
CPAMD016	AMD K6-3 400	$265
CPAMD017	AMD K6-3 450	$345

AMD K6-2

Code	Model	Price
CPAMD014	AMD K6-2 400	$125
CPAMD018	AMD K6-2 450	$165
CPAMD019	AMD K6-2 500	$260

AMD K6 III 3DNow!

AMD Athlon

Code	Model	Price
CPAMD020	AMD Athlon 500Mhz	$595
CPAMD021	AMD Athlon 550Mhz	$1035
CPAMD022	AMD Athlon 600Mhz	$1395

AMD Athlon

Cyrix MII Cyrix

CYRIX M2 Processors

Code	Model	Price
CPIBM009	M2-333MHZ	$75

Heatsink and Fan

Code	Model	Price
MISADE006	Socket 7 CPU FAN	$15

Memory

SDRAM - 64-Bit, 168 pin Memory for use with Pentium System using Intel TX/LX/BX/ZX Chipsets. PC-100 RAM is compatible with 66Mhz & 100Mhz bus speeds.

ECC Memory extends to provide error checking & correction and ideal for servers and mission critical systems.

Code	Model	Price
RAGEN008	32MB PC66 SDRAM	$89
RAGEN024	32MB PC100 SDRAM	$75
RAGEN022	64MB PC100 SDRAM	$Call
RAGEN023	128MB PC100 SDRAM	$Call
RAGEN028	128MB ECC PC100 SDRAM	$Call

Call for the latest prices on 256MB SDRAM

EDO RAM - For use in 486 systems and most Pentium & Pentium Pro type systems. Used in Pairs in Pentium system.

Code	Model	Price
RAGEN005	16MB EDO SIMM 72Pin	$69
RAGEN006	32MB EDO SIMM 72Pin	$109

FAST PAGE RAM - For use in older 486, Pentium systems and some printers. Used in pairs in Pentiums.

Code	Model	Price
RAGEN002	16MB SIMM 72Pin	$75
RAGEN003	32MB SIMM 72Pin	$119

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AOpen AX6BC Mainboard

Introducing the AOpen AX6BC Mainboard featuring the Intel BX Chipset. A unique jumperless design, CPU monitoring & protection circuitry combines ease of use with reliability and performance. Winner of many international awards you can be sure that the AX6BC Mainboard will work with you, not against you.

- **Supports Intel Pentium II 233 - 450Mhz, Pentium III up to 550MHz & Celeron Processors,**
- **5 x PCI, 2 x ISA, 1 x AGPx2**
- **768MB SDRAM for 3 x DIMM slots**
- **2 x Serial, 1 x Parallel, 2 x USB Ports**
- **2 x EIDE Controller & ATX Form Factor**
- **Supports Wake on LAN, DMI, SB-LINK**

Pentium III Ready

$195 MBACE000

AOpen MX3W Celeron Mainboard

The AOpen MX3W supports the latest Celeron (PPGA) Socket 370 Processors to 500Mhz Powered by the Intel 810 DC100 Chipset and features jumper less design and an integrated 2D/3D Graphics Engine with Dynamic Video Memory.

- **Supports Intel Celeron Socket 370 (300 - 500Mhz)**
- **66/100Mhz Front Side Bus**
- **Integrated 4MB Video & AC97 SoundCard**
- **Up to 512MB SDRAM for 2 x DIMM slots**
- **3 x PCI, 1 x AMR (Audio/Modem Riser)**
- **2 x EIDE UDMA/66 Controller**
- **Micro ATX Form Factor**

Integrated Video and Sound

Optional add on "Software Modem"
$30 MBACE010

$225 MBACE005

BONUS Norton AntiVirus With All AOpen Mainboards

AOpen AX63 Pro Mainboard

The AOpen AX63 Pro Mainboard brings true computing performance at a very affordable price. Powered by the advanced VIA Apollo Pro Plus AGP chipset the AX63 Pro Mainboard supports technologies such as Jumperless design, Resetable Fuse for USB & K/B, BIOS flash protection and CPU protection.

- **Supports Intel Pentium II 233 - 450Mhz, Pentium III & Celeron Processors**
- **Supports PCI33 133 Mhz RAM**
- **5 x PCI, 2 x ISA, 1 x AGPx2 Expansion slots**
- **768MB SDRAM for 3 x DIMM slots**
- **2 x Serial, 1 x Parallel, 2 x USB Ports**
- **2 x EIDE Controller & ATX Form Factor3**

PCI33 Ready

NEW

$195 MBACE007

AOpen MX59 Pro Mainboard

AOpen MX59 Pro Mainboard Supporting the latest Socket 7 offerings from Intel, Cyrix & AMD the MX59 Mainboard also offers an integrated graphics card & sound card in one. Ideal for upgrades or budget PC offerings.

- **Supports AMD K6-2 266-450Mhz & K6-3 400-450Mhz**
- **Supports Intel Pentium, MXX & Cyrix MII 300-366Mhz**
- **66/100Mhz Bus speed**
- **2D/3D Graphics Engine (4/8Mb shared memory) & AC97 Sound**
- **2 Dimm Slots of Max. 512Mb Memory**
- **4 X PCI, 2 X ISA, 2 x EIDE UDMA/66**
- **Micro ATX**

Integrated Video and Sound

Socket 7

$175 MMACE004

AOpen 48X EIDE CD-ROM

- ATAPI IDE CD-ROM
- Ultra DMA Supported
- 512Kbytes buffer
- Compatible with CD-DA, CD-ROM/XA, CD-I/MPEG, Photo CD, Karaoke CD, CD, CD-RW, Packet write
- Audio Extraction
- MAX Transfer rate 7200 Kb/sec

$95 MMACE001

AOpen 6X EIDE DVD-ROM

The AOpen DVD-ROM will allow you to watch the latest Hollywood blockbuster or play the latest multimedia titles on your PC today. Not only will the AOpen DVD-ROM play all your DVD media but also your existing CD, CDR & CDRW titles.

$199 MMACE008

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Mainboards GIGABYTE

Dual BIOS Gigabyte Technology is pleased to introduce DualBIOS, a "hot spare" for your system bios. In the event that your primary BIOS fails the second BIOS backs you up almost automatically. A feature found in the GA-BX2000, GA-6GXU & GA-6GXDW boards.

GA-BX2000

- Intel BX Chipset Slot 1
- Support Intel Pentium II/III & Celeron Processors
- Supports 66/75/83/100/112/133Mhz System BUS
- 4 DIMM sockets to 1GB DRAM
- 5x PCI, 1x AGP, 2x ISA Expansion slots
- ATX Form Factor with USB

$215 MBGIG024

GA-5AX

- ALI - Aladdin V AGPset
- Support AMD K6 III Processor, Intel Pentium MMX
- SupportsAMD K6-3, Cyrix and Intel Pentium to 500Mhz
- 512KB Cache onboard
- 3 DIMM sockets to 768MB DRAM
- 5x PCI, 1x AGP, 20x ISA Expansion slots
- ATX Form Factor with USB

Support AMD K6-3

$140 MBGIG025

GA-6BXDU

- Intel 440BX AGP Chipset
- Dual Channel Ultra 2 Wide SCSI
- Support Dual Pentium II/III Processors up to 600Mhz
- Supports 66/100 Mhz & Auto Selection Clock
- 3x Ultra 2 SCSI, 1x Ultra SCSI Ports
- 4x PCI, 3x ISA Expansion Ports & 1x AGP Port

DUAL PROCESSOR

$825 MBGIG026

GA-5AA

- Ali Chipset, Socket 7
- SupportsAMD K6-3, Cyrix and Intel Pentium to 500Mhz
- Clock Multiplier 1.5 to 5.5X
- 3 DIMM Sockets to 768MB DRAM
- 1x AGP, 3x PCI, 1x ISA
- Baby AT Form Factor

$135 MBGIG021

Mainboards ABIT

ABIT BE6 Mainboard

The latest offering from ABIT features the Intel BX chipset based Slot 1 Mainboard supporting the Ultra DMA/66 IDE protocol and SOFT MENUTM technology.

- Supports Intel Pentium II/III and Celeron to 600Mhz
- 3 x DIMM sockets to 768MB SDRAM
- 2 x UDMA33/66 IDE Ports, 2 x UDMA33 Ports
- 1 x AGP, 5 x PCI, 2 x ISA Ports
- Onboard Serial, Parallel, USB and I/O

$255 MBABI001

ABIT BP6 Dual Celeron Mainboard

ABIT announces the release of the World's First Dual Socket 370 motherboard, the BP6 doubly defies the limitations of Intel's BX chipset by offering both Dual Socket 370 CPUs and UDMA/66 IDE Ports satisfying even the most demanding users.

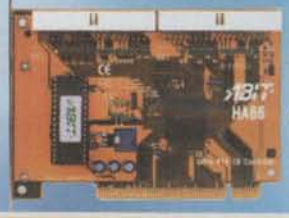
- Supports up to 2 x Celeron Processors to 500Mhz
- 3 x DIMM sockets to 768MB SDRAM
- 2 x UDMA33/66 IDE Ports, 2 x UDMA33 Ports
- 1 x AGP, 5 x PCI, 2 x ISA Ports
- Onboard Serial, Parallel, USB and I/O

$325 MBABI002

HotRod UDMA/66 PCI Accelerator

With the help of the ABIT Hot Rod 66 your mainboard can now support the new UDMA/66 specification. The new disc interface provides maximum disc performance using current PCI technology. Special 80-conductor cable is supplied reducing crosstalk and interference in addition to a simple plug and play installation process.

- UDMA/66 performance
- Simple installation



$125 MBABI003

ADAPTEC 2906 PCI CARD FOR DESKTOP PCS

Connect up to 7 SCSI devices and gain great performance by moving to SCSI with the Adaptec 2906. Run your ZIP drive or Scanner up to 6 times faster than with a parallel port connection. Adaptec EZ-SCSI Software is included to help you manage your peripherals.

$115 CCGEN021

ADAPTEC 2940U2W

Unleash the full potential of your server or workstation

When it comes to boosting the performance of servers and workstations to 80Mb/s utilising Ultra2 SCSI (LVD) technology. By combining the Adaptec 2940U2W with high-performance disk drives you'll get performance worth howling about.

RETAIL KIT **$709** CCGEN018

OEM **$455** CCGEN022

Adaptec SlimSCSI 1460

Connect SCSI devices to your laptop

For attaching a wide range of SCSI devices such as drives, CDROMs, peripherals and scanners to your notebook computer look no further than the Adaptec 1460 SlimSCSI card. Designed for Windows 95/98 and includes DB25 and Honda50 connections.

$239 CCGEN011

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Sporting the industry's first **Ultra ATA/66** high speed data transfer feature, the new Caviar drives feature a maximum transfer rate of 66Mb/s. That's double the speed of its nearest rival. All Western Digital Caviar drives undergo 200 rigorous tests before shipping to ensure compatibility and reliability with all your existing hardware and software applications.

Desktop EIDE Drives

NEW

The WD Caviar family is the ideal solution for desktop personal computers and provides the best combination of performance and value for entry-level to mainstream PCs.

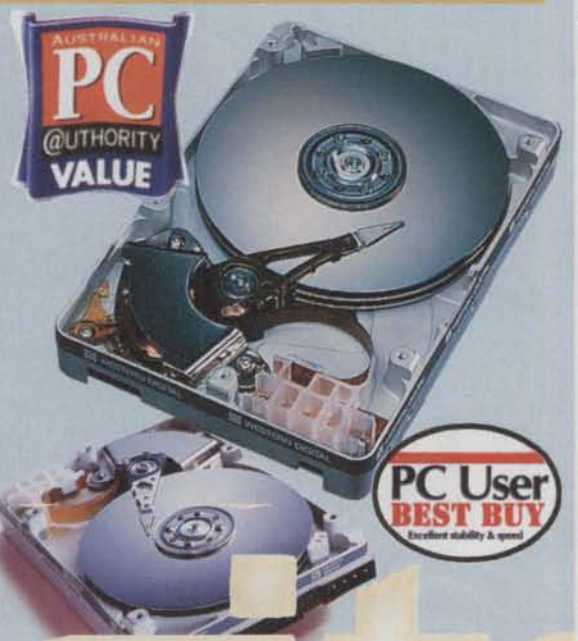
Code	Size (GB)*	Seek	RPM	Cache	Price
HDWES003	6.4GB	9.5ms	5400	2MB	$225
HDWES005	10.2GB	9.5ms	5400	2MB	$275
HDWES006	13.6GB	9.5ms	5400	2MB	$315
HDWES007	20.5GB	9.5ms	5400	2MB	$499

Performance EIDE Drives

NEW

Designed for high-end desktop PCs and single user workstations, WD Expert drives outperform ordinary EIDE and even low-end SCSI solutions with average speeds 20 percent fast than conventional 5400 RPM EIDE drives.

Code	Size (GB)*	Seek	RPM	Cache	Price
HDWES008	9.1GB	9ms	7200	2MB	$335
HDWES009	18GB	9ms	7200	2MB	$535



Data Lifeguard

The Data Lifeguard feature is in every Western Digital hard drive. Data Lifeguard protects end user data by automatically detecting, isolating and repairing possible problem areas before data loss can occur.

ATA 66 READY

* 1Gb = 1 Billion bytes

Protecting your Computer and peripherals.

PLUG 'N PROTECT

BlackoutBuster (500 VA)

Is a UPS that has all the features to satisfy all your needs.Protects a standard PC for up to 25 mins.

$285
PSPKE000

Add the

Powerpack

For increasing the power capacitor backup time of the system.
One powerpack doubles the BlackoutBusters power. Doubles backup time to 50 mins.

$270
PSPKE003

Smartpack

Adding Smartpack allows BlackoutBuster to be monitored and controlled by a computer.

$165
PSPKE001

Code	Model	Price
PSPKE000	Blackout Buster 500VA	$285
PSPKE001	Smartpack	$165
PSPKE002	Micropack	$65
PSPKE003	Powerpack 500VA	$270
PSPKE004	Blackout Buster 1000VA with Smartpack	$690

MicroPack

This is an attachment for auto matic shutdown of Windows, OS/2 and Novell netware operating systems.

$65
PSPKE002

Emergency backup battery

Voltage protection

Power Surge protection

Internet line protection

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High performance disk solutions from Seagate catering for:

- High end multimedia & video applications (A/V)
- High performance workstations, servers and super computers
- Graphics and 3D Applications
- Internet/Intranet based webservers

Seagate Medalist Pro

Cost effective, high performance SCSI hard drives with 512K cache and a spindle speed of 7200RPM.

Code	Model	Capacity	Interface	Tr/Rate	Price
HDSGT025	ST36530N	6.4GB	Ultra SCSI	20Mbps	$559
HDSGT026	ST36530W	6.4GB	Ultra Wide SCSI	40Mbps	$559

Seagate Barracuda

High Capacity, ultra high performance SCSI Hard Drives with a seek time of 7ms and a spindle speed of 7200RPM.

Code	Model	Capacity	Interface	Tr/Rate	Price
HDSGT014	ST39173W	9.1GB	Ultra Wide SCSI	40Mbps	$729
HDSGT027	ST39173LC	9.1GB	LVD 80 Pin	80Mbps	$729
HDSGT028	ST39173LW	9.1GB	LVD 68 Pin	80Mbps	$729
HDSGT036	ST39173FC	9.1GB	Fibre Channel	100Mbps	$729
HDSGT023	ST118273W	18GB	Ultra Wide SCSI	40Mbps	$1410
HDSGT029	ST118273LC	18GB	LVD 80 Pin	80Mbps	$1410
HDSGT037	ST118273FC	18GB	Fibre Channel	100Mbps	$1410

Seagate Cheetah

Ultimate Performance for servers and high-powered workstations. Features an industry leading 10,000 RPM spindle speed & a cache buffer of 512K.

Code	Model	Capacity	Interface	Tr/Rate	Price
HDSGT031	ST39102LC	9.1GB	LVD 80 Pin	80Mbps	$1105
HDSGT035	ST39102FC	9.1GB	Fibre Channel	100Mbps	$1105
HDSGT033	ST118202LC	18GB	LVD 80 Pin	80Mbps	$1795
HDSGT038	ST118202FC	18GB	Fibre Channel	100Mbps	$1795

LVD: Low Voltage Differential Drives are for use with Ultra 2 SCSI Controllers such as the Adaptec 2940U2W Controller giving you a transfer rate of 80Mbps. Backwards compatible with Ultra & Ultra Wide SCSI Controllers.

TravelStar 2.5" IDE Drives

LAPTOP DRIVES

Experience blistering performance on a notebook computer. The IBM range of TravelStar IDE drives feature 512K of cache accessed via an Ultra ATA interface. Compatible with most notebook & laptop computers.

Code	Capacity	Seek Time	Tr/Rate	Price
HDIBM002	3.2GB	13ms	33Mb/s	$310
HDIBM025	4.8GB	12ms	33Mb/s	$355
HDIBM027	6.4GB	12ms	33Mb/s	$465
HDIBM031	8.1GB	12ms	33Mb/s	$750

UltraStar 3.5" SCSI Drives

Quality, performance at a reasonable price is what the IBM UltraStar range of hard drives offer. Featuring a seek time of 7.5ms, cache size of 512K and a spindle speed of 7200 RPM be sure that the UltraStar range of drives will give you sizzling performance that wont break the bank!

Code	Capacity	Interface	Tr/Rate	Price
HDIBM012	9.1GB	Ultra Wide SCSI	40Mb/s	$675
HDIBM032	18GB	Ultra Wide SCSI	40Mb/s	$1255

The Quantum CR EIDE Hard Drives

feature the new ATA4 Ultra/66 Interface enabling a transfer rate of 66Mb/s with supporting controllers. Other features 512Kb of Buffer and an internal transfer rate of 190Mb/s.

UDMA 66

Code	Capacity	Seek Time	Spindle Speed	Tr/Rate	Price
HDQTM042	4.3GB	9.5ms	5400RPM	66Mb/s	$175
HDQTM043	6.4GB	9.5ms	5400RPM	66Mb/s	$205
HDQTM044	8.4GB	9.5ms	5400RPM	66Mb/s	$255
HDQTM045	12.7GB	9.5ms	5400RPM	66Mb/s	$320

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DIAMOND

www.diamondmm.com

Stealth III S540 Xtreme

With Diamond's Stealth III S540 Xtreme, Xtreme gaming has arrived! Stealth III S540 Xtreme delivers robust 2D/3D features and speedy performance at an unbelievable price. Based on the S3 Savage4 Xtreme chipset and featuring S3TC texture compression, integrated advanced 3D quality features include 128-bit processing, 32MB of memory, up to AGP 4X support, a 32-bit 3D rendering pipeline and massive texture processing. Stealth III S540 Xtreme delivers stunning visual quality at blazing speeds for the hottest 3D games. Stealth III S540 Xtreme is a complete solution, powering colorful 2D business applications with amazing speed and accelerating cinema-quality DVD movies.

16MB AGP OEM **$165** DCDIA024

32MB AGP OEM **$189** DCDIA023

Xtreme **$249** DCDIA030

Viper V770

Wreak Havoc with the Ultimate 3D

The Viper V770 features 32MB memory & 128-bit power for fierce 3D and 2D graphics performance. Based on the NVIDIA RIVA TNT2 - with the latest 3D technology, AGP 4X support, and full optimization for Windows 95/98 and Windows NT 4.0. Viper V770 Ultra! goes further to include a tweaked hardware design for the fastest gaming solution on earth.

32MB ULTRA RETAIL **$425** DCDIA026

32MB RETAIL **$329** DCDIA027

16MB OEM **$215** DCDIA028

Monster Sound MX300

Ultimate 3D Audio Experience!!!

Want to annihilate your opponents every time? Diamond's Monster Sound MX300 gives you awesome combat tools: Aureal's latest A3D 2.0 positional audio, 4-speaker support and 64-voice hardware wavetable synthesis. Imagine playing your favourite PC game hearing footsteps from behind you and gun shots from overhead.

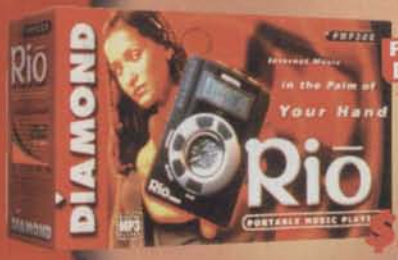
- Hardware A3D 2.0 acceleration
- 9.6 audio systems
- Features Dolby Digital (AC-3) support
- Advanced 320-voice wavetable with support for downloadable samples
- Supports DOS and Windows games

FULL RETAIL **$135** MMDIA011

Rio PMP300

The first portable MP3 music player that stores up to 60 minutes of digital quality sound. Load the latest songs on to Rio directly from your Hard Drive, personal CD's or the Internet and carry them with you. It's smaller than an audio cassette and has no moving parts, so it never skips. Powered by a single AA battery, Rio provides up to 12 hours of continuous music playback.

- Lightweight - only 70 grams
- Palm size for easy portability
- 32MB built-in flash memory



$299 MMDIA012

Rio 500

Internet Music in the Palm of Your Hand!

The Rio 500 puts the power of digital audio in the palm of your hand! Rio 500 is skip-free, portable audio player that hold up to two hours of digital quality music and up to 32 hours of spoken audio content. Rio is the perfect companion for people on the go.

- 64MB built-in memory - Expandable to 96MB
- Back-lit LCD display with preset & custom EQ functions
- 13 hours continuous playback with single AA Battery

HOT

$525 MMDIA015

16MB Flash Memory Card $129 MMDIA014

32MB Flash Memory Card $199 MMDIA016

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SKYWELL technology

Magic TNT2

The Magic TNT2 using the nVIDIA RIVA TNT2 chipset is the fastest and meanest gaming card on the market today. Featuring a 300Mhz RAMDAC, the Magic TNT2 supports resolutions up to 2048 x 1536 with ease. Loaded with 32MB of ultra quick SGRAM the Magic TNT2 offers complete support of 3D textures and is optimized for Pentium III and AMD 3DNow systems.

PRICE DROP

32Mb AGP
$275
DCMAG017

Magic TNT2 M64

The Magic M64 utilising the nVIDIA TNT2 128-bit chipset features award winning performance at a competitive price. Featuring 32MB of SDRAM and a 300Mhz RAMDAC for crystal clear resolution, the M64 is ideal for graphics, hardcore gaming and watching DVD action in full screen mode.

$165
DCMAG020

4Mb S3 AGP Card
$45
DCMAG006

8Mb SIS AGP Card
$65
DCMAG021

MAGIC VANTA

Running at a breath taking 125Mhz and loaded with 16MB of memory the Magic Vanta can deliver breakthrough 3D gaming and complete support for video and DVD delivered by the latest AGPx2 technology.

- 128-bit combined 2D/3D Voodoo Banshee chipset
- 16MB Memory with 125Mhz SGRAM
- Supports Glide, OpenGL, DirectX, Direct3D
- NT 4.0 & Windows 95/98 compatible

AGP
$129
DCMAG019

Magic TV

Watch full screen TV on your PC with the FlyVideo TV Card. Capture live video & images from your VCR or Camcorder, or use a CCD Camera and video-conference over a LAN or Internet. Teletext included with FM radio.

TV Card/Remote/FM Radio
$135
MMMAG002

Magic TOPLAN (USB NET)

TopLan is a USB to USB Host connector allowing two or more computers to share programs, files and peripherals such as printers with ease. Multiple network nodes supported to a super-fast 12Mbps under Network Neighborhood in Windows 98. Simple PnP installation ideal for multi-player gamers & those with more than one computer. Pack includes a TopLan Host and 2 x 5m USB cables.

$125
NWMAG000

MAGIC LINK

Simple, portable and fast link for transfering files between 2 USB-enabled computers. A must for notebook & mobile users. Software & 6ft cable included.

$55
NWMAG001

Magic Theater Pro

Magic Theater Pro 5.1 Channel system will deliver Hi-Fi and true Dolby Digital AC-3 sound on your PC with today's games and movie titles. Comes complete with a Magic Sound Live! PCI soundcard and a speaker system consisting of a subwoofer, 4 satellites and a center channel delivering a total of 47 Watts RMS.

$325
MMMAG003

DOLBY DIGITAL

Magic Sound Lite!

The Magic Sound Lite PCI Card uses multi-channel technology to deliver surround sound through only 2 speakers. Professional wavetable synthesis with native DOS game compatibility.

$65
MMMAG004

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CREATIVE Multimedia

Creative Nomad MP3 Player

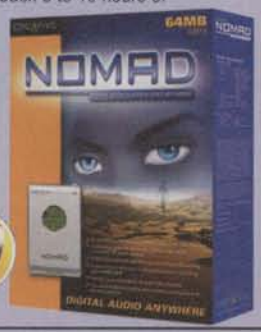
32MB version
$449
MMCRE039

64MB version
$549
MMCRE040

The compact, sleek Creative NOMAD is smaller than a deck of cards and weighs less than 100 grams - High Tech Design The NOMAD players can playback 8 to 10 hours of continuous music and audio.

LCD Screen
FM Turner
Voice Recording
Creative Digital Audio Center software

NEW



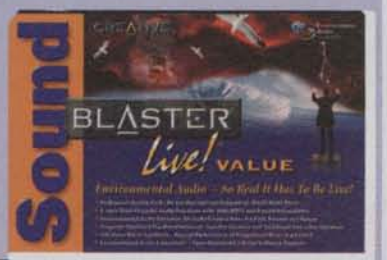
Sound Blaster Live! Value

Retail
$259
MMCRE031

OEM
$149
MMCRE038

Experience the most powerful sound card ever! Sound Blaster Live! introduces a new dimension of audio by including features and performance surpassing professional Hollywood-quality audio equipment.

- 256-voice capabilities delivers richer sound quality through 4 Speakers
- Environmental Extensions™ for incorporating 3D environmental effects into titles



Video Blaster WebCam II

$239
MMCRE042

The Video Blaster WebCam II just got better! Creative's fun, affordable and easy-to-use digital camera now comes with full USB (Universal Serial Bus) support in Windows® 98. This high-powered device offers faster frame rates,sharper images, new features and software to capture, create and communicate on your PC.

The Video Blaster WebCam II USB is the ideal tool for expressing yourself with live full-color motion video.

PC-DVD™ Encore 6X

$625
MMCRE041

NEW

Creative PC-DVD™ Encore 6X with Dxr3 brings the future of digital home entertainment to your PC and your home. Witness vibrant digital imagery of DVD video, immerse yourself in cinema-like Dolby Digital (AC-3) surround audio, and harness he massive data storage that's only found in PC-DVD technology. Includes a 6X DVD-ROM, Dxr3 MPEG II Decoder & software.

matrox Graphics Cards

POWERED BY MATROX G400 SERIES

The Millennium G400 Series

A powerhouse of breakthrough technologies and next-generation features, the Millennium G400 Series of graphics boards are outfitted with Matrox's unique DualHead Display feature, built-in support for true Microsoft® DirectX™ 6 Environment-Mapped Bump Mapping and trademark Vibrant Color Quality² rendering. It is these unequaled, must-have features which not only distinguish them from all other graphics solutions, but which revolutionizes the way you use computers.

The Millennium G400

Fitted with 16 or 32MB of fixed, high-speed SGRAM, the Millennium G400 provides lightning fast, ultra-crisp displays with its 300 MHz RAMDAC, while at the same time delivering stunningly realistic image quality in the most demanding business and home applications without compromising performance.

G400 RETAIL 16MB	G400 RETAIL 32MB	G400 16MB OEM	G400 32MB OEM
$329	$415	$295	$395
DCMAT033	DCMAT034	DCMAT036	DCMAT037

The Millennium G400 MAX

The Millennium G400 MAX is fitted with a fixed 32MB of high-bandwidth SGRAM and is supercharged with a 360 MHz UltraSharp RAMDAC capable of driving high-end monitors at resolutions of up to 2048 x 1536, 32-bpp at 85Hz. Targeted directly at the accept-no-compromise PC gamer and at professionals who require an exceptionally large desktop display, the Millennium G400 MAX slams the performance gear into overdrive with an increase in raw speed of more than 30 per cent over the Millennium G400.

NEW

G400 MAX 32MB AGP
$485 DCMAT035

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Speakers

ALTEC LANSING

ACS22 Tower Speaker System

Powerful sound from a two tower system
Ideal for those consumers who need excellent PC audio output, either for teleconferencing, games or music CDs, but who do not have a requirement for a subwoofer. Excellent value for money.

- Small footprint with headphone output
- 5 Watts RMS Power
- Produces powerful audio output from two satellites

$65
MMALT008

ACS33 PowerCube Speaker

3-Piece system dramatically enhances PC Audio
The PowerCube Speaker system with its compact satellites delivers powerful audio playback from a 3-piece system. Active subwoofer can be set for desired bass response and the electronic controls on the satellites adjust the volume for both satellites and subwoofer simultaneously.

- 10 Watts Satellite Power
- Volume control and Power ON L.E.D
- 15 Watts Subwoofer Power

$145 NEW
MMALT005

ACS45.1 PowerCube Speaker

Proven Sonic Performance at an amazing price.
Introducing the Altec Lansing ACS45.1 PowerCube Speakers, a three piece multimedia audio solution at an unbelievable price. Experience the enhanced output of the PowerCube satellite system . Great for games and CD's, the ACS45.1 will bring hi-fi audio to your computer desktop today.

- 12 Watts Satellite Power
- 3" full range driver
- 20 Watts RMS
- 6" subwoofer

$175
MMALT001

ADA305 Digital PowerCube

Digital Pro Logic Ready
The ADA305 Digital PowerCube delivers multidimensional audio excitement resulting from a Dolby Pro Logic decoder in the subwoofer. To deliver multichannel audio, the Digital PowerCube uses Altec Lansing's patented side-firing speakers to deliver true multidimensional audio.

- 20 Watts Satellite Power
- 2 x 3" full range drivers
- 6" Subwoofer
- USB ready
- Sub 20Watts RMS

$365 USB
MMALT006

ACS54 PowerPlay Plus Speaker

5-Piece system designed especially for the sound demands of gamers. PowerPlay Plus is the only speaker system designed especially for gamers that provide high quality, powerful surround sound game audio output. This 5-piece system provide a true multidimensional surround sound experience

- 20 Watts Satellite Power
- 20 Watts Subwoofer Power
- Unique Bracket/stands provide convenient mounting possibilities for surround speaker

$269 NEW
MMALT009

ADA70 Altec Lansing

No Sound Card Requited USB allows multimedia audio to enter the digital domain so that you can experience real-life sound reproduction via your personal computer. The ADA70 is a 3 piece system with USB connection for the most realistic audio playback you can experience from your personal computer. Great for CDs and multimedia.

- ADA 70 Digital USB Speaker
- 3" Full Range Driver & 1" Dome Tweeter
- 14 Watt RMS Satellite Speakers
- 6.5" Dual Voice Coil Woofer
- 20 Watt RMS Subwoofer

$295 USB
MMALT007

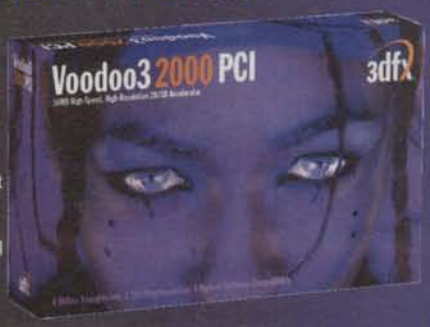
Graphics Cards

3dfx

- **32 bit internal rendering**
- **full 128-bit 2D accelerator**
- **DVD hardware assist**
- **DirectX®, Glide® and OpenGL®**

VooDoo III 2000

Industry-Leading Performance
The 143MHz Voodoo3 2000 AGP and PCI boards are expected to generate up to 6 million triangles and 286 Megatexels per second at resolutions of up to 2,048 by 1,536 pixels. The Voodoo3 2000 boards will feature a 300MHz RAMDAC and 16MB of SDRAM.



VooDoo III 3000

The 166MHz Voodoo3 3000 AGP board is expected to generate 7 million triangles and 333 Megatexels per second at resolutions of up to 2,048 by 1,536 pixels. Features a 350MHz RAMDAC, TV/S-Video Out capabilities as well as a game bundle featuring best-selling titles. The Voodoo3 3000 will also feature 16 MB of SDRAM.

Built in TV Output

PCI **$299** DC3DF001 AGP **$299** DC3DF000 **$399** DC3DF002

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Dynalink Magic TView

- Watch TV & rapid Teletext on your PC
- Supports Coax, composite, S-Video & Philips camera input
- Full function remote control
- Optional FM radio tuner with auto-scan/memory
- TV tuner and video capture card - capture video and digital stills
- Window or full screen

$129 MMDYN001

Built-in (FM Tuner) **$149** MMDYN002

Dynalink VoiceDesk56Pro & VoiceCard56Pro

- Dual-mode K56flex & V.90 auto switching
- Plug & Play
- FaxStream DUET & CallerID
- Fax machine & Telephone Answer Machine (TAM)
- Hands-free Speakerphone (requires optional MK30 Headset)

VoiceDesk56 Pro External **$169** FMDYN001

VoiceCard56 Pro Internal ISA **$139** FMDYN000

Dynalink PCMCIA (PC Card) Modem

- Dual-mode K56flex & V.90 auto switching
- Send and receive Faxes
- Compatible with all laptops
- Plug & Play

$179 FMDYN003

Dynalink PC-TV Box

- Remote control
- Sends PC Graphics to a Big-screen TV
- No software required
- Great for demonstrations, presentations and gaming.

$199 MMDYN000

Dynalink USB

4 Port USB Hub for connecting multiple USB devices.

HUB **$75** NWDYN000

Upgrade your PC system to accomadate USB devices with PCI Port Converter

$55 CCDYN000

WITH ALL DYNALINK PRODUCTS

new value pack

PLUS:

or THE LOT $40

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Montego II QUADZILLA

The total 3D gaming experience!

The gamer's choice for the best in 3D audio just got better. Introducing the new montego II Quadzilla from Turtle Beach. Armed with the very latest Wavetracing™ technology, Quadzilla submerses you in the astounding 3D audio world of the hottest new games and websites with realistic three-dimensional audio images. And with stereo S/PDIF digital output, you get the best theater quality surround sound for your PC.

- A3D 2.0 positional audio with four speaker support and S/PDIF digital output
- High-quality audio performance with 97 dB signal-to-noise ratio
- 320 voice PCI wavetable synthesis
- Includes Voyetra Software Suite

A3D Quadraphonic

$325 MMTUR002

Montego A3D Xstream

High-performance sound card for games, multimedia and MIDI music

Turtle Beach brings you the ultimate in PCI audio technology with the Montego A3DXstream™. With advanced features such as DirectSound acceleration, 64-voice wavetable synthesis, Aureal 3D positional audio, and hardware-based, full-duplex record/playback,

- High resolution 18-bit converters
- High-quality with better than 92 dB signal-to-noise ratio
- 16 hardware digital mixers
- Aureal 3D Interactive Sound
- Includes Voyetra Software Suite

$175 MMTUR003

A3D Surround

PC GAMES · HARDWARE FULL DUPLEX ENHANCED · INTERNET READY · GENERAL MIDI · Voyetra

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Swann COMMUNICATIONS

Specifically designed to suit Australian conditions the SwannSmart 56K line of modems bring a hassle free personal fax, data and voice telecommunication centre right to your fingertips!

SwannSmart 56K

The SwannSmart 56K modem brings full communication capabilities to your desktop today. Featuring a download speed of 56Kb/s and Group 3 faxing the SwannSmart 56K is available in both an external & internal version.

- ITU V.90 Standard
- Enhanced ADPCM CODEC for Voice
- Data Compression rates to 115,200bps
- Auto Dial & Answer
- Auto Power Management
- Answering Machine / Voice Mail
- 5 Year limited warranty

External **$169** FMSWA000

Internal **$89** FMSWA001

FREE WEBWORKS 99 INTERNET TOOLKIT

HOT & NEW Swann Modem

Speed Deamon

Swann's NEW value for money modem with all the key features of the Award Winning SwannSmart at a bargain price.

$129 FMSWA003

SwannSmart 56K Global PC Card

Specifically designed to suit conditions almost anywhere in the world the SwannSmart 56K PC-Card brings a complete data communication centre to your laptop computer....anywhere!

- ITS V.90 & 56Kflex Standard
- Location selection utility automatically configures your modem settings relative to the country's standard
- Phone Cable Adaptor for various countries
- Countries supported include Australia, UK, USA, Taiwan, HK, Canada, Japan, Germany to name a few

Use in 27 Countries

$195 FMSWA002

Modems

U.S. Robotics — 56K Voice Message Modems

Productive conference calls with the clarity and convenience of a top-quality full-duplex speakerphone - in the same device that brings the internet onto your desktop.

Enhanced Features:

- Full Duplex Speakerphone
- Stores voice and fax messages even when your PC is switched off

STANDARD **$235** FMRO8011

Professional Modem

Includes the following extra features:

- Caller ID
- One button access to voice mail
- Independent Fax Forwarding.

PROFESSIONAL **$295** FMRO8012

3Com Megahertz 10/100 LAN x 56K Modem

- 10/100Mbps Ethernet & Fast Ethernet
- Enjoy high-speed downloads up to 56 Kbps with the V.90 & x2 56K standard
- Intelligent Auto Installation
- Configue your modem for use worldwide

$425 FMRO8013

NetComm — CardModem56

Netcomm CardModem56 The CardModem56 Combo is the ideal PCMCIA modem if you demand the ultimate in speed and portability

$275 FMNET013

NetComm — Card Modem 56K Global GSM

Gives the world traveller the freedom of data connection either through a land line or mobile phone (GSM), with data download speeds of up to a scorching 56,000bps.

WORLD WIDE COMPATIBILITY

$325 FMNET017

NetComm — Roadstar II Ultra 56K

The Roadster II 56 Ultra SVD is a voice/data/fax modem which lets you transmit and receive faxes and data directly from your desktop. The USB version goes further eliminating the need for the a power supply.

HEADSET INCLUDED - FREE COPY OF SYMANTEC WINFAX V8.0

$249 FMNET015

SERIAL **$245** FMNET012

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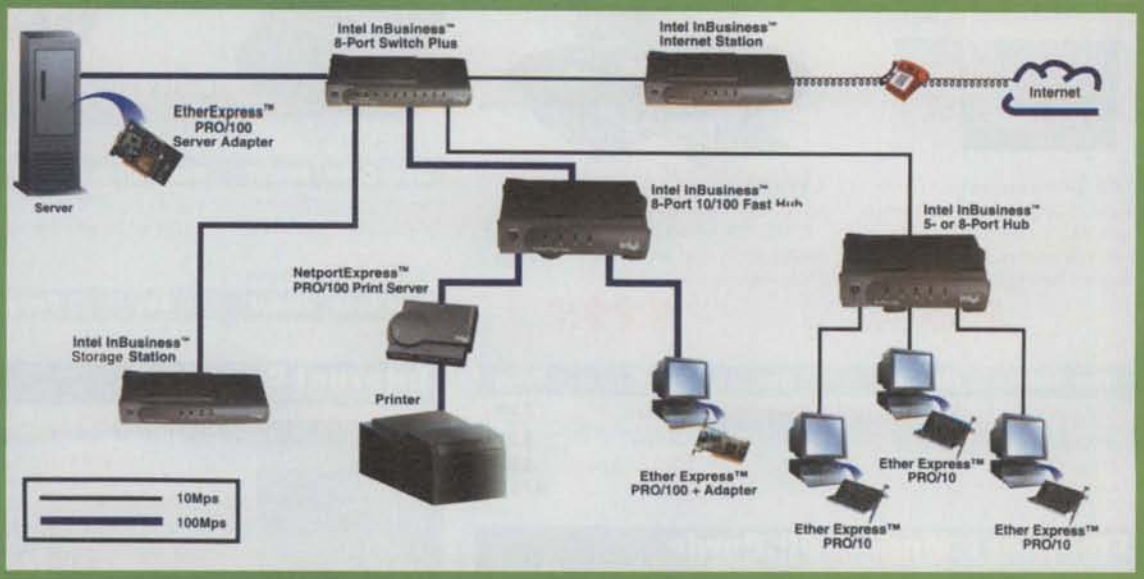
intel® InBusiness™ Small Business Networking Products



Ethernet PCI Adapters

For customers who want basic, high speed connectivity, the Intel® PRO/100+ provides peak performance and Adaptive Technology to optimise network performance. 10/100M auto-negotiation automatically connects at the highest speed for maximum performance. Server adaptor with 85229 chipset optimized for server configurations.

Server Adaptor
$189
NWINT016

Management Adapor
$149
NWINT015

InBusiness™ Switch

The Intel® InBusiness™ 8-Port 10/100 Switch is perfect for improving the performance of your network using standard or Fast Ethernet. Designed to give users high-speed performance at an affordable price.

- Plug & Play installation
- Auto sensing ports automatically detect speed of connected device. Switching provides each user or hub a direct channel to network devices

$565
NWINT014

InBusiness™ Hubs

Intel® InBusiness™ Hubs are designed so you can easily create your own small network or expand an existing network in minutes. Designed to be small enough for the desktop, they are the perfect solution for sharing devices and other resources.

- Simply Plug & Play Installation
- Crossover port allows you to connect to other Hubs
- Choice to 10 or 100Mbps RJ-45 Ethernet Connectivity

Code	Model	Speed	Price
NWINT008	5-port	10Mbps	$99
NWINT009	8-port	10Mbps	$119
NWINT010	4-port	100Mbps	$190
NWINT011	8-port	100Mbps	$345
NWINT012	8-port	10/100 Auto	$425

InBusiness™ Print Station

The Intel® InBusiness™ Print Station is the easy way to share printers over a network. Set-up is so simple that within minutes your small business can be printing to shared printers over a 10 or 100Mbps network. Now you can locate up to 2 printers anywhere on your network independent of PCs with a single Print Station.

- 10 or 100Mbps Ethernet Connection
- Supports 2 Parallel Printers
- No configuration hassles with simple installation wizard

$315
NWINT007

InBusiness™ Internet Station

The Intel® InBusiness™ Internet Station is the ultimate way to connect your office to the Internet. Cost-effectively share one analog or ISDN connection, one phone connection and Internet account over the network. Easily combine multiple analog connections and lines to increase your access speeds.

- 10Mbps Ethernet Connection
- 2 x PCMCIA & 1 x Serial for Modem
- Supports TCP, DHCP, FTP, HTTP, SMB
- Includes Client Software & Web-browser configuration & management tools

$749
NWINT006

InBusiness™ Storage Station

The InBusiness™ Storage Station lets your office share files over the network, and includes PC backup software for data protection. Simple installation and setup make it the easiest way to provide shared storage for your employees by simply draging and dropping files on a central drive.

- 10 or 100Mbps Ethernet Connectors
- Supports TCP, DHCP, FTP, HTTP, SMB
- Includes Client installer CD software

12GB
$1650
NWINT004

24GB
$2315
NWINT005

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D-Link

Ethernet NICs

DFE-530TX Ensure your future network upgrades are catered for with this 10/100 auto-negotiating network adapter. Plug & Play support for trouble free installation.

$55 NWDLI002

DFE-905 Network Kit for SOHO and home user. Easy to install. Includes two 10/100 PCI network cards, Cat.5 20 feet cables and a fast enthernet hub. Simple Plug-and-play installation.

$295 NWDLI033

Item Code	Model	Bus	Speed	Price
NWDLI000	DE-220PCT	ISA	10Mbps	$30
NWDLI001	DE-528CT	PCI	10Mbps	$39
NWDLI026	DFE-500TX	PCI	10/100Mbps	$85
NWDLI006	DE-906	PCI Kit	10Mbps	$155

Ethernet & Modem PC-Cards

DMF-560TX PCMCIA 10/100Mb LAN & 56 Modem PC Card.

- V.90 Fax/Data Modem.
- Compatible with 10 & 100Mbps Networks

$395 NWDLI025

Item Code	Model	Description	Price
NWDLI003	DE-660CT	10Mbps PCMCIA Ethernet Card	$105
NWDLI013	DFE-650TX	10/100Mbps PCMCIA card	$160

Fax/Modems

DFM 560E
D-Link's range of Fax/Modems are V.90 & K56 Flex compatible utilising the high performance Rockwell chipset.

$135 EXTERNAL FMDLI001

Item Code	Model	Description	Price
FMDLI000	DFM-560I	56K Internal Modem	$85
FMDLI003	DM-560	56K Fax Modem PCMCIA	$179

Ethernet & Fast Ethernet Switches

PRICE DROP

DES-1016 16 Port 10/100 Switch
For a cost effective solution aimed at reducing network congestion look to D-Link's range of switches for improving network performance.

$1245 NWDLI032

Item Code	Model	Ports	10Mbps	100Mbps	Price
NWDLI011	DES-810	10	8	2	$789
NWDLI021	DES-815	15	12	3	$875
NWDLI022	DES-1008	8	✔	✔	$620
NWDLI035	DES-1024	24	✔	✔	$1750

Ethernet NICs

NEW

USB Hubs are **Available Now.**
Making installation easy through the USB interface

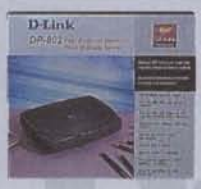
USB HUBs

Item Code	Model	Description	Price
NWDLI037	DU-H4	4 port USB HUB Port	$75
NWDLI038	DU-H3SP	3 USB +1Serial +1 Parallel Hub	$169

USB PCI Adapter

Item Code	Model	Bus	Ports	Price
NWDLI036	DU-A2	PCI	2	$45

Internet Servers



DP-802 Internet and Print Server for SOHO Networks. Dual use of Com ports. Supports NAT for single ISP user account, Dial-on-Demand, DHCP, PPP, PAP/CHAP Security. Dual use of Com ports for double bandwidth. Support for Analog modem or BRI ISDN TA. Admin through Windows based programs.

$580 NWDLI034

Item Code	Model	Ports	Speed	Price
NWDLI024	DP-602	1 Ethernet Port, 2CommPorts	10/100Mbps	$490

Print Servers

DP-300 Turn any printer into a network printer through D-Link's range of print servers. Just plug in your printer and connect the print server to your Network hub via Ethernet. Compatible with Win NT/ 95/ 98, UNIX, TCP/IP, NetBEUI, IPX & Appletalk Protocols.
10/100Mbps Enabled

$435 NWDLI015

Item Code	Model	Printers Supported	Price
NWDLI015	DP-300	2 x Parallel, 1 x serial, 10/100Mbps	$435
NWDLI023	DP-101	1 x Parallel, 10Mbps	$265

Ethernet & Fast Ethernet Hubs

D-Link's range of hubs provide easy connectivity options for Ethernet users as well as a cost effective way to upgrade to Fast Ethernet networks.

10Mbps Ethernet Hubs

Item Code	Model	Ports	BNC / AUI	Price
NWDL017	DE-805TP	5 UTP		$95
NWDL004	DE-809TC	8 UTP	BNC	$105
NWDLI028	DE-809TP	9 UTP		$140
NWDLI005	DE-816TP*	16 UTP	✔	$280
NWDLI030	DE-824TP*	24 UTP	✔	$460

10/100Mbps Nway Dual Speed Hubs

These Dual Speed Hubs provide a network that is compatible with a mixture of 10Mbps & 100Mbps users.

Item Code	Model	Ports	Stackable	Price
NWDLI027	DFE-904	4		$175
NWDLI012	DFE-908DX	8	✔	$360
NWDLI014	DFE-916DX	16	✔	$860
NWDLI020	DFE-2624X*	24	✔	$1490

*Rackmount 19"

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EXCELLENCE THROUGH INNOVATION

AUSTRALIA WIDE 3 YEAR ON SITE WARRANTY*

NEW RANGE OF MITSUBISHI MONITORS

Mitsubishi Diamond View 1554i 15"

- 15" Monitor ideal for home users
- Dynamic Focus picture tube
- 13.9" Viewable, 0.28 dot pitch
- Max Resolution 1024 x 768 @65Hz
- Weighs 13kg

$299 MOMIT009

Mitsubishi Diamond View 1570 15"

- 15" Monitor ideal for SOHOs
- Dynamic Focus picture tube
- 13.9" Viewable, 0.28mm dot pitch
- Max Resolution 1280 x 1024 @60Hz
- Weighs 13kg with OSD

$349 MOMIT010

Mitsubishi Diamond View 1770e 17"

- 17" Monitor for casual users
- High Contrast CRT
- 15.9" Viewable, 0.27mm dot pitch
- Max Resolution 1280 x 1024 @60Hz
- Weighs 18kg with OSD

PRICE DROP

$499 MOMIT012

Mitsubishi Diamond View 1795DT 17"

- 17" Monitor for demanding users
- **Flat, Diamondtron Tube**
- Apperture Grille
- 16" Viewable, 0.25mm dot pitch
- Max Resolution 1600x1200 @ 75Hz
- Weights 23kg with OSD

NEW

$775 MOMIT013

Mitsubishi Diamond View 1995 19"

- 19" Monitor for professionals
- 18" Viewable, 0.26mm dot pitch
- Max Resolution 1600 x 1200 @75Hz
- Weights 24kg with OSD
- BNC & 15Pin Input

PRICE DROP

$1149 MOMIT005

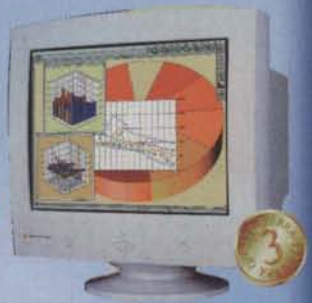
Editor's Choice apcmag

'the only 19" to equal & better Sony in our tests'
APC MAGAZINE APRIL 1999

Mitsubishi Diamond View 2107 21"

- 21" Monitor for professionals
- 20" Viewable, 0.26mm dot pitch
- Max Resolution 1600 x 1200 @85Hz
- Weights 30kg with OSD
- BNC & 15Pin Input

VALUE



$1945 MOMIT006

Editor's Choice apcmag

'Compared to the Sony Trinitron, the Diamond View scored equal to, or better than in every regard, apart from brightness'
APC MAGAZINE APRIL 1999

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MITSUBISHI CD-ROM DRIVES

DIAMOND DATA CD-ROM drives are Multi Read Compliant, support Ultra DMA data transfers and employ advanced Constant Angular/Linear Velocity for improved reads and transfers.

Code	Model	Price
MMMIT001	40x EIDE CD-ROM	$85
MMMIT005	50X EIDE CD-ROM	$115

MITSUBISHI DRIVES

Mitsubishi offers the latest innovation in floppy disk drive technology, the LS-120, with 120 megabyte capacity. The LS-120 is also compatible with older 1.44 MB disc.

Code	Model	Price
BUMIT000	Mitsubishi LS -120	$169
BUMIT001	120MB capacity diskettes	$25

3.5" 1.44MB Floppy Drive $29

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Adelong Computers

Monitors — Videocom

Model	15"DD-556BA	17"DC-770BA	17"DC-770LAT	19" DA-995
Screen Size	13.8" Viewable	16" Viewable	16" Viewable	18"Viewable
Dot Pitch	0.28mm	0.27mm	0.25mm	0.25mm
Max Resolution	1024x768 N/I	1280 x 1024 N/I	1280 x 1024 N/I	1600 x 1200 N/I
User Control	OSD	OSD	OSD	OSD
Price	$295 MOVID003	$465 MOVID000	$525 MOVID002	$899 MOVID001

3 YEAR ON SITE WARRANTY*

*QUEENSLAND, NSW, VICTORIA ONLY

Monitors/CD-R — Panasonic

Panasonic PanaSync SL75

Panasonic 17" SL75 has Unique Short Length display. Featuring a High 1280 x 1024 Resolution, Compact design that is ideal for Home, SOHO and Offices users. Windows 95/98 Plug & Play compatible.

$725 MOPAN015

NEW

Panasonic PanaSync SL90i

19" monitor with a large 18" true viewable area. Super sharp and compact in size.

$1245 MOPAN011

Panasonic 8x20 SCSI CD-Recording Kit

Want no frills high speed SCSI recording performance then look further than this bundle. It includes the new 8x record, 20x read internal SCSI drive, a PCI SCSI card and recording software. Panasonic reliability and 8x recording performance but only at a 4x price.

$645 MMPAN007

NEW

Bare drive only **$535** MMPAN008

CD-ROM/CD-RW Drives — DELTA

Delta 44x CD-ROM Drive

One of the fastest and most reliable CD-ROM drives on the market. This new range of IDE CD drives from Delta represent the best value for money. Supports reading of CD-R, CD-RW and other media.

$85 MMDEL000

Delta CD-RW Drive 4x4x20

Looking for the latest CD ReWriting technology at a great price then look no further than the Delta 4x record, 4x rewrite and 20x read IDE CDRW drive. This is the best value kit on the market with all software and hardware needed to start recording straight away. One blank CDR and CDRW included with kit.

$399 MMDEL001

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http://www.adelong.com.au
e.mail: info@adelong.com.au

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Rosebery NSW 2018
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OnStream
Recording the Digital Age™

The last drive you'll ever have to buy!

Data Backup drives from OnStream

OnStream's digital drives are the affordable storage solution for workstations and server systems. Compatible with Windows 95,98 & NT, the bundled OnStream Echo software works in Windows just like any other drive, giving you access to files from any application. In addition, OnStream Echo software makes backing up your hard drive completely automatic. You'll never have to think about doing a backup again. Simply install the software and it starts working immediately - in the background. Everyday, OnStream Echo automatically makes copies of every new or changed file, like clockwork.

An ideal solution for anyone who:

- Doesn't want to bother with the hassle of doing backups
- Hates the learning curve associated with new products
- Needs affordable gigabytes of extra space
- Can't afford to lose their work
- Works with large files
- Gets frustrated searching for files across multiple cartridges

Up to 50GB of storage per cartridge

"Advanced Digital Recording (ADR) delivers extraordinary Reliability & Performance"
"Compatible with leading network backup software like Seagate Backup Exec and CA ARCserveIT*"

* SCSI Models only under NT

ONSTREAM 30GB Drives

IDE DI30
- Internal 5 ¼ IDE Drive
- 1Mb/s Transfer Rate
- For use with ADR 30GB Cartridge (not included)

$590 BUON5000

PARALLEL DP30
- External Parallel Port Drive ideal for Removable Storage
- 0.7Mb/s Transfer Rate
- For use with ADR 30GB Cartridge (not included)

$775 BUON5001

SCSI SC30
- Internal 5 ¼ SCSI Drive
- 2Mb/s Transfer Rate
- For use with ADR 30GB Cartridge (not included)

$975 BUON5002

ONSTREAM 50GB Drive

SCSI SC50
- Internal 5 ¼ SCSI Drive
- 2Mb/s Transfer Rate
- For use with ADR 30GB & 50GB Cartridges (not included)

$1345 BUON5003

PACKAGE CONTENTS

- OnStream Digital Drive
- OnStream Echo Software
- IDE/SCSI Cable
- Power Splitter
- User Guide

OnStream Media

ADR 30GB Compressed Cartridge **$99** BUON5004 **ADR 50GB** Compressed Cartridge **$129** BUON5005

RICOH

CD-RW Drives

When every second counts.....

Accelerated in every way. The birth of a new high-speed CD.R/RW Drive.

CD_R/RW Drive

MP7060 Series

EIDE
$665 MMRIC007

SCSI
$699 MMRIC008

Fastest CDRW Drive Around

Write CD-R ×6 | ReWrite CD-RW ×4 | Read ×24

BUFFER MEMORY	**2MB**
WRITING/READING SPEED	**Writing: 6x (CD-R), 4x (CD-RW)** **Reading: Max. 24x (CAV)**
AVARAGE ACCESS TIME	**Less than 120msec. (24x)**
INSTALLATION	**Vertical with eject button on top)/Horizontal**

The MP7060 Series offers further advances in reading/write speed. Ricoh's MP7060 Series CD-R/RW drives feature 6x CD-R recording speed, 4x CD-RW rewriting speed, and up to 24x CD-ROM/CD-RW disc reading speed. High-speed access makes CD-RW the ideal medium for daily data backup.

Horizontal & Vertical installation possible.

4x ReWrite 4 Record 20xRead MAX

MP7040A EIDE **$635** MMRIC005

MP7040S Internal SCSI **$745** MMRIC006

FORMATTED MEDIA

Ricoh (1x4x)CD-RW Disc 74 Mins 650Mb **$29** MMRIC003

Ricoh CD-R Disc 74 Mins 650Mb **$3** MMRIC004

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10am-4pm Saturday

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iomega

Zip 250

zip 250

SuperFloppy Preferred By Millions
The new drive comes in two flavors: parallel port (for PC's) and SCSI (for Mac's or PC's with a SCSI connection). Zip 250 SCSI drive users will benefit from a performance boost, up to 56 times faster than standard floppy drives and 1.4 times faster than external CD-ROM drives. Best of all, current Zip 100 drive users need not worry about their investment in 100MB Zip using 250MB media).

- 50% faster than the original Zip 100 drive.
- Large 250Mb Capacity
- Compatible with 100Mb Zip Disk
- Proven Reliability

SCSI $345 BUIOM032

PRICE DROP

250Mb Zip $35 BUIOM034

Parallel $345 BUIOM033

Zip Drives

Increase your storage quickly, easily and economically - as you need it. With a 100MB Zip Drive you can take your data anywhere at anytime. Each disk stores 100MB of data and you can add them, as your needs grow. Available in Parallel, SCSI, Internal IDE and the new USB interface. You also get Zip tools on CD.

Ext. SCSI/Parallel $199

IDE ATAPI $135 BUIOM007

Drives

BUIOM001	100MB EXT SCSI ZIP Drive	$199
BUIOM000	100MB EXT PARALLEL ZIP Drive	$199
BUIOM002	100MB INT SCSI ZIP Drive	$239
BUIOM026	100MB USB ZIP Drive	$255

Accessories for Zip

BUIOM012	100MB PC ZIP Disk	$24
BUIOM005	100MB PC ZIP Disk (3 Pack)	$63
BUIOM006	100MB PC ZIP Disk (10 Pack)	$190
BUIOM015	ZIP ZOOM SCSI Card	$55
BUIOM022	ZIP Card, PCMCIA to SCSI	$185

$185 BUIOM022

$24 BUIOM012

Jaz 2GB Drive

jaz 2GB

The new Jaz Drives hold a whopping 2GB of data per disk. Best of all these drives are fast and backwards compatible with the industry standard 1GB disk. Stream & capture video, backup data and store images are just some of the applications that the Jaz Drive can be used for. SCSI Card needed.

EXTERNAL $645 BUIOM018

INTERNAL $645 BUIOM017

Accessories for Jaz

BUIOM024	JAZ 2GB Disk	$195
BUIOM025	JAZ 2GB Disk (3 Pack)	$559
BUIOM031	JAZ PCMCIA to SCSI Converter	$215
BUIOM013	JAZ Traveller, SCSI to Parallel	$85

$179 BUIOM020

$85 BUIOM013

Click!

clik! 40

Clik!™ drive can store 40Mb of data on a Clik! Disk. The Click Drive not only reads your Clik! Disk but also your Compact Flash and Smartmedia cards. The Mobile Clik! Drive connects to your printer port using a pass through technology and can run on rechargable batteries for mobile applications. There is even a Type II PC Card that will connect your Clik! Drive up to your notebook. (Mobile bundle only)

$20 BUIOM037

BUIOM035	Clik Camera Bundle	$495
BUIOM036	Clik Camera+Mobile Bundle	$575

Iomega Buz

buz

All the hardware and software you need to be a video genius Introducing the Iomega Buz-the easiest way to get multimedia from camcorders, DVD, CD-Roms, VCRs and laserdiscs into your PC! It's a video capture and editing board combined with an Ultra SCSI controller that lets you capture Multimedia (fullmotion) video, sounds, digital pictures, music) into a PC

$349 BUIOM023

APPLE MAC $525 BUIOM027

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Fax: (02) 9267 5042

Value ReWriters

With these Olympic CD ReWriter kits, all you have to do is plug in the drives, install the software and burn away. Whether you are a musician mastering your own CD of using CD's to backup your data, these kits are the most economical way to go.

Olympic 2x4x8 CD ReWriter Kit

- 2 speed rewrite/4 speed record/8 speed read
- Internal EIDE CD Rewrite
- Adaptec Direct 2.5B Easy, Easy CD Creator 3.5D software
- 2MB data Buff Memory
- 150ms access time
- Cable, driver and manual included

$335 MMOLY005

High Speed ReWriters

Want to use CD media but need to record over and over your data. Using one of the fastest ReWriters in the business, this kit is ideal for the power user.

Olympic 4x4x20 CDR writer Kit

- 4 speed rewrite/20 speed read cd writer
- Adaptec Direct v2.5b
- Easy CD Creator 3.5b
- Cables, driver and manuals included

SCSI **$695** MMOLY002
PCI SCSI Card included

IDE **$399** MMOLY004

DVD

This kit will allow you to watch and play DVD titles on your computer. Simply install this kit and it's bundled software and turn your PC into a full home theatre system.

Olympic DVD Kit

- 6x DVD/ 32 x CD
- Internal EIDE DVD Drive
- CyberLink Power DVD v1.5 Software Decoder
- 3DNOW! & IA Streaming SIMD Extensions
- Video Brightness Control Limitation
- A3D Compatibility
- Cables, driver and manuals included

$335 MMOLY003

Try the NEW Olympic range of disc storage products.

Storage Drives

ORB™ 2.2GB

INTERNAL AND EXTERNAL

Size. Speed. For everyone.

Easy to install Unlimited Capacity Infinitely Rewritable

STATE-OF-THE-ART TECHNOLOGY MR

EIDE Drive
RRP **$399**
BU-ORB000

Call for latest pricing

2.2 GB Disk
RRP **$79**
BU-ORB005

Look at the power ORB delivers!

- *3.5 hours of audio*
- *2+ hours of video*
- *2,000+ colour photographs*
- *22 100MB floppy disks*
- *SCSI, EIDE or Parallel Port versions*
- *1500+ 1.44MB floppy disks*
- *3+ CD ROM games*

CASTLEWOOD

BUORB000	2.2Gb Internal EIDE ORB Drive	$399
BUORB002	2.2Gb Internal SCSI ORB Drive	$399
BUORB005	2.2Gb ORB Disk	$79

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CD-RW/CD-R

Verbatim

Smart and Friendly

INCLUDES FREE SOFTWARE WORTH $1620!

CD Racer

$395 MMVER003

Double Speed CD-Recorder with CD-RW ReWritability

CD Racer Internal is a 2x writer, 2x rewrite, 24x playback CD-Recorder. **Includes free software worth $699**, the Racer is a low cost CD recorder solution that brings you new levels of performance and technology.

CD Rocket RW

THE WORLD'S FASTEST CD-R DRIVE!

The CD Rocket RW is an 8x Writer, 2x ReWriter, 20x Playback CD Recorder with a plentiful 2MB buffer. Able to create a full 650MB CD in as little as 9 minutes, the Rocket RW comes with an unbeatable suite of software applications and all necessary accessories.

Internal SCSI **$865** MMVER001

External SCSI **$1095** MMVER002

CD-RW

$15 MMVER004

Verbatim CD-R Disks

Pack of 10 **$29** MMVER000

Scanners

olympic TECHNOLOGY

These scanners represent the best value for money. Comes complete with every thing you need including easy to use software.

OTC-600 EP

30bit Colour Depth
Optical Resolution 300x600 dpi
Max. Resolution 4800x4800 dpi
Scan Area 8.5"x11.6" (A4)
Parallel Connection

$99 IOOLY000

SPECIAL

OTC-1200 EP

36bit Colour Depth
Optical Resolution 600x1200 dpi
Max. Resolution 9600x9600 dpi
Scan Area 8.5"x11.6" (A4)
Parallel Connection

$149 IOOLY001

OTC-1200 SP

36bit Colour Depth
Optical Resolution 600x1200 dpi
Max. Resolution 9600x9600 dpi
Scan Area 8.5"x11.6" (A4)
SCSI 2 for PC and Mac

$195 IOOLY0002

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EPSON Printers

A4 Colour Inkjet

Home User

Stylus Colour 640

- Perfect Photo Quality printer for desktop publishing at home. It features true 1440 x 720 dpi resolution.
- 5ppm Black/3.8ppm Colour
- 1440 X 720DPI

$309

PREPS020

SOHO

Stylus Colour 740

- Delivers a precisely controlled ink droplets - the result is greater detail and smoother halftones. It's PC and Mac. compatible and offers USB connectivity.
- 6ppm Black/6ppm Colour
- 1440 X 720DPI

$489

PREPS021

Office Colour

Stylus Colour 900

- It also offers flexible connectivity, Serial, USB, Parralel and optional ethernet.The combination of printing technologies ensure it is a high-speed, high-image quality printer.
- 12ppm Black/11.7ppm Colour
- 1440 X 720DPI

$779

PREPS024

Specialist Printers

Photo Colour

Stylus Photo 700

- Using a six-colour QuickDry ink system (CcMmYK), that delivers continuous tones, smooth gradations, sharp detail and more vibrant colours.
- A4, A5, Envelope, Index card, Photo paper
- 1440 X 720DPI

$419

PREPS011

Graphic Reproductions

Stylus Photo1200

- The PHOTO 1200 delivers 1440dpi, full-bleed A3+ prints with ink droplets invisible to the naked eye.
- A3+, A4, A5, Envelope, Index card, Photo paper
- 1440 X 720DPI

$929

PREPS025

Large Format

Stylus Colour 1520

- A2*, Super A3/B, US B, A4, letter, legal, B4, B5, envelope, continuous paper,
- 1440 X 720DPI
- Stylus COLOR 1520 provides the means of printing to A2 and SuperA3/B sized paper.

$959

PREPS010

SAMSUNG

Printers

SAMSUNG LASER PRINTERS Challenge the Limits of business Performance!

Office Laser Printer

ML-5000A

Fast 8PPM Printing Speed
True 600 x 600 DPI Outstanding Resolution
HP®PCL®5e Compatible Emulation
Various 45 scalable Fonts
One-piece Integrated Toner & OPC imager of 5000 Pages at 5% Coverage
Easy to Use-Easy installation

$599 PRSAM000

Printer Toner Cartridge for ML-5000A

$199 INSAM003

5000 pages per cartridge

Business Laser Printer

ML-6050

Fast 12PPM Printing Speed
True 600 x 600 DPI Outstanding Resolution
HP®PCL6® Compatible Emulation
Various 45 scalable Fonts
One-piece Integrated Toner & OPC imager of 5000 Pages at 5% Coverage
Easy to Use-Easy installation

$899 PRSAM001

Printer Toner Cartridge for ML-6050

$199 INSAM004

5000 pages per cartridge

Workgroup Laser Printer

ML-7000

Fast 17PPM Printing Speed
Superior Printer Performance
100Mhz RISC Processor
First Page Printing Time of Under 13 Seconds
HP®PCL6® Compatible Emulation
Optional Postscript Level II
Ethernet Card for Robust Network Connectivities
Standard Duplex Printing Function

$1599 PRSAM002

Printer Toner Cartridge for ML-7000

$299 INSAM005

SECOND TRAY FEEDER IS AN OPTIONAL EXTRA

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Adelong Computers

Printers

HEWLETT PACKARD

DeskJet

Value

DeskJet 695C

- In expensive and simple to use, the HP DeskJet 695C printer produces affordable, high quality colour and black printing.
- 5ppm Black/ 1.7ppm Colour
- 600 x 600 DPI

$259

PRHPD039

Home User

DeskJet 710C

- The perfect printer for the family or student who cares about getting job done quick and easy - with brilliant photo-quality colour.
- 6ppm Black/ 3ppm Colour
- 600 x 600 DPI Photo REt II

$325

PRHPD040

Soho

DeskJet 810C

- Produce projects with photo-quality images and crisp black text for school and home easily, quickly and creatively with the new HP DeskJet 810C printer.
- 6.5ppm Black/ 4.5ppm Colour
- 600 x 600 DPI Photo REt II

$399

PRHPD056

DeskJet

Professional

DeskJet 880C

- Your creative printing projects will look their best with the HP DeskJet 880C printer. Whether it's spectacular colour photos or elegant type you want, the DeskJet 880C can bring your imagination to life.
- 8ppm Black/ 5ppm Colour
- 600 x 600 DPI Photo REt II

$479

PRHPD051

Office Colour

DeskJet 895Cxi

- The HP DeskJet 895Cxi delivers outstanding results that give you a competitive edge. Photo-quality colour enriches your documents with persuasive power. And crisp, rich blacks produce laser-quality text and graphics to impress the most discerning audience.
- 10ppm Black/ 6ppm Colour
- 600 x 600 DPI Photo REt II

$795

PRHPD043

Over-Size PhotoColour

DeskJet 1120C

- Get the big picture with the HP DeskJet 1120C Professional Series printer. Photo-quality color and versatile printing at sizes up to 11 x 17 inches make it ideal for businesses that want printing options, not printer limits.
- 6.5ppm Black/ 4.5ppm Colour
- 600 x 600 DPI Photo REt II

$815

PRHPD025

Printers

PRHPD033	OfficeJet 635	$675
PRHPD055	OfficeJet 725	$875

PRHPD034	LaserJet 3100	$1345
PRHPD041	LaserJet 1100	$789
PRHPD047	LaserJet 2100	$1385
PRHPD057	LaserJet 4050	$2299

IOHPD020	ScanJet 3200C	$189
IOHPD021	ScanJet 4200C	$315
IOHPD023	ScanJet 5200C	$475
IOHPD024	ScanJet 6200C	$759

Print/Fax/Scan

all-in-one
Printer/Scanner/Copier

HP OfficeJet R45

The reliable HP OfficeJet R45 fits right into the busiest home office or small business. It provides printing, scanning, and copying, all in colour, and all in one easy-to-use product. That saves space, reduces clutter, and simplifies set-up.

- 11ppm Black/ 8.5ppm Colour
- 600 x 600 DPI Printing
- 600 x 2400 DPI 30 bit Flatbed Scanning
- 100 sheet paper tray

$1449

PRHPD058

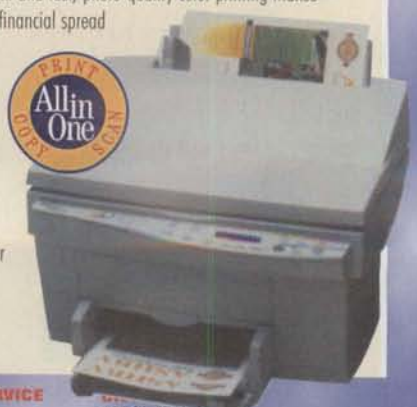
HP OfficeJet R65

The reliable HP OfficeJet R65 Series gives you high quality performance and versatility for professional results. The razor-sharp text and fast, photo-quality color printing makes documents stand out, whether they're financial spread sheets or color brochures.

- 11ppm Black/ 8.5ppm Colour
- 600 x 600 DPI Printing
- 600 x 2400 DPI 30 bit Flatbed Scanning
- 100 sheet paper tray
- 30 page automatic document feeder

$1649

PRHPD059



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BubbleJet

Value

BJC-265

- Unbelievable value with this versatile bubblejet printer. For even greater versatility, the BJC-265 offers the option of PhotoRealism inks. The PhotoRealism inks for photorealistic prints at a low price.
- 3.4ppm/ 0.5ppm Colour
- 720 x 360 DPI

$135

PRCAN026

Home User

BJC-2000SP

- Professional print performance; personal ease, The user-friendly BJC-2000SP is fully featured. And sets a new standard in value and performance. Uses the Drop Modulation Technology, which is exclusive to Canon. Meet the one-stop solution all your home-office print needs. The optional colour scan head can be used for colour scans, OCR and faxing. Windows®95 or 98 only.
- 720 x 360 DPI Resolution
- 5ppm/2ppm Colour

$175

PRCAN029

NEW

Over-Size Photo Colour

BJC-5000

- Need photorealistic colour and large format printing, then this Canon printer is perfect for you. Using 7 colour printing technology. The BJC-5000 is the first Bubble Jet printer equipped with the new dual-cartridge system. It's not just two ink cartridges, but a system that lets both cartridges act independently to complement each other, and improve performance.
- A3 printing
- 7.5ppm/ 2.85ppm Colour
- 1440 x 720 DPI

$349

PRHPD022

PRICE DROP

BubbleJet

SOHO

BJC-6000

- Presenting the ultimate in Speed, Quality, and Cost-Effectiveness. The new standard in colour printing from Canon. Using 6 colour printing and drop modulation technology, the BJC-6000 produces photorealistic images.
- Separate ink tanks for each colour
- 8ppm Black / 5ppm Colour
- 1440 x 720 DPI

$475

PRCAN028

Professional

BJC-7100

- Need to print high quality colour images at high speed, then the 7 colour photo realism system in the Canon BJCTM 7100 will be the perfect choice. Capable of photorealistic printing on plain paper, this high speed bubblejet is perfect for the demanding graphics user.
- 8ppm/ 5ppm Colour
- 1200 x 600 DPI

$525

PRHPD025

Compact

BJC-80

- Portable printing solution with all the features of a desktop printer. Photorealism, Drop modulation technolgy and features that are exclusive to the portable environment like IRDA. Best of all it is only 1.4Kg and fits in half a briefcase.
- AC/ Battery Powered
- 4.5ppm/ 1ppm Colour
- 720 x 360 DPI

$335

PRCAN000

Instant Scan Capabilities

IS-12 Scanner head

$135 PRCAN0[illegible]

Imaging

SOHO

FB-620P

- Parallel
- A4 Scanning 600DPI, Enhanced 2400DPI Resolution
- B&W 40sec, Colour 120sec
- Includes Omini page LE for OCR

Parallel

$255

IOCAN003

Value

FB-320P

- Parallel
- Scanning at 300DPI
- B&W 20sec, Colour 60sec

Parallel

$165

IOCAN002

PowerShot A50

PowerShot A50

- The worlds smallest zoom lens-equipped megapixel camera.
- 1280 x 960 megapixel resolution for outstanding image quality.
- 28-70mm power zoom lens with macro.
- 8MB Compact Flash card.
- Windows 95/98/NT 4.0 compatible.

$1145

IOCAN009

NEW

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Data Switches

Never again will you need multiply monitors, keyboards and pointing devices with the range of CPU Switching devices. A single keyboard, mouse and monitor can control up to 8 computers simultaneously without any cable changes. These CPU Switches are digital and require only the push of a button. Excellent for network administrators or anyone who wishes to control 2 or more computers hassle free!

Features:

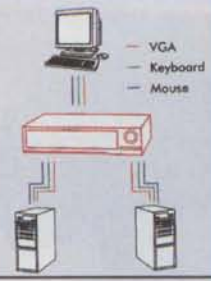
- Supports Mouse/KB emulation for automatic bootup
- Supports VGA, SVGA & Multisync monitors
- LED's give current status
- Easy to install & use

Master View Plus

- PS/2 style or AT style keyboard and mouse connectors.
- Microsoft Intellimouse, Logitech First Mouse+, Mouse Man+
- Mouse Convertion - PS/2 Mouse Controls All Connection PCs
- Cascadable To three Levels

- CS-122 Switch between 2 PCs. Features:

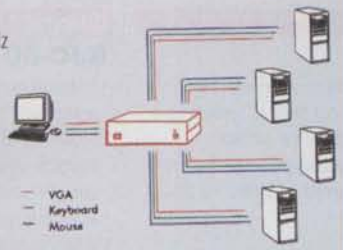
- VGA Bandwidth of 180Hz
- VGA resolution of 1600x1200 @60Hz



DSADE037 **$275**

- CS-114 Control up to 4 PCs with the CS-114.

- VGA Bandwidth of 100Mhz
- VGA Resolution of 1024x768 @80Hz
- Support intellimouse wheel



DSADE038 **$375**

- CS-128

AT & PS/2

- 8 Port Switch Box

DSADE036 **$695**

Item Code	Description	Price
CBGEN127	AT CABLE SET for CS-128	$39
CBGEN128	PS/2 CABLE SET FOR CS-128	$39

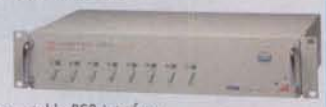
Master View Plus

- Mirosoft Intellimouse, Logitech First Mouse, Mouse Man+...Support
- Mouse Conversion - PS/2 Mouse Controls All Connected PCs
- PS/2 Style Keyboards Controls All PCs
- Superior Video Quality - Up To 1920 x 1440
- Cascadable To Three Levels
- LED Display For Easy Status Monitoring
- Rack Mountable
- Microphone and Speaker Support CS-1008, and CS-1016

EXCELLENT FOR MULTIMEDIA

- CS-138 Control up to 8 PCs with the CS-138. Features:

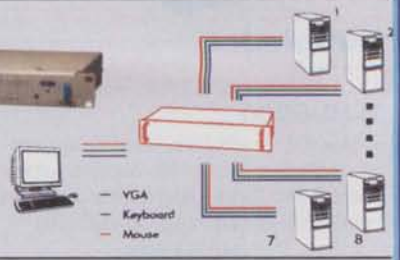
- VGA Bandwidth of 180Mhz
- VGA Resolution of 1600x1200 @60Hz



DSADE041 **$755** Rack mountable PS2 interface

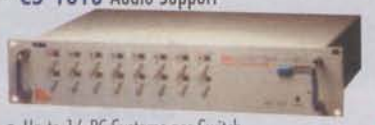
- CS-1008 Audio Support

- Up to 8 PC Systems per Switch
- Connect up to 256 PC Systems
- 180Mhz VGA Bandwidth

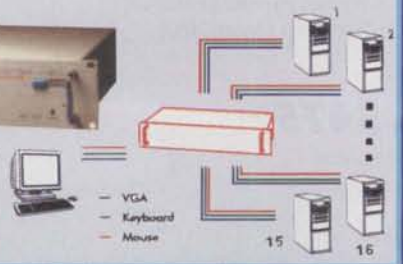


DSADE045 **$795**

- CS-1016 Audio Support



- Up to 16 PC Systems per Switch
- Connect up to 512 PC Systems
- 180Mhz VGA Bandwidth



DSADE046 **$1350**

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each cable set connects to one computer.

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CBGEN099	3M PS/2 Cable Set CS/122/114/138	$35	CBGEN164	1.8M PS/2 Cable Set CS122/114/138	$29	CBGEN170	5M PS/2 Cable Set CS1008/1016 Audio	$50
CBGEN127	3M AT Cable Set CS128	$35	CBGEN166	10M PS/2 Console Extenstion M/F	$65	CBGEN171	5M PS/2 Cable Set CS1008/1016 Audio	$50
CBGEN128	3M PS2 Cable Set CS128	$35	CBGEN168	3M PS/2 Cable Set CS 1008/1016 Audio	$39			

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can duplicate PC video signals and amplify them for transmission to multiple monitors. These splitters are capable of supporting high band widths, which can easily accommodate the latest resolution technology. An excellent choice for presentations or broadcasting demos or special events.

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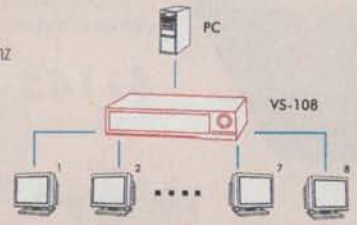
- Excellent for high quality multimedia and presentations



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1920 x 1440@80Hz

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4 Port Video Splitter
1920 x 1440@80Hz

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VS-138

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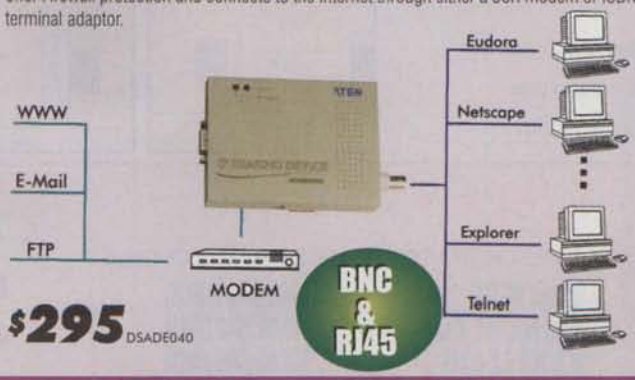

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$15 CBGEN155

USB B CABLE

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Outlook 2000	✓	✓	✓	✓	✓	✓
Powerpoint 2000	✓		✓	✓	✓	✓
Publisher 2000		✓	✓	✓	✓	✓
Small Business Tools		✓	✓	✓	✓	✓
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Display	800 x 600	1024 x768
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Mic & Spkr	Yes	Yes
Battery Life	3+ hours	2+ hours
Port replicator	No	No
Select bay	No	No
DVD capable	No	Yes
Weight	1.4 kg	1.9 kg
Warranty	3 Years	3 Years
DAA modem	Yes	Yes
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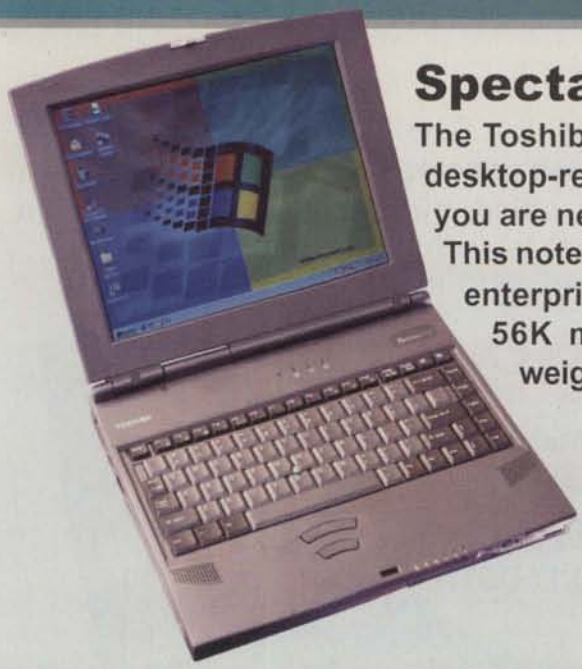

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Display	1024 x 768	1024 x 768	1024 x 768
CD-ROM	24x max.	24x max.	24x max.
Mic & Spkr	Yes	Yes	Yes
Battery Life	3+ hours	3+ hours	3+ hours
Port replicator	No	No	No
Select bay	Yes	Yes	Yes
DVD capable	No	No	No
Weight	2.9 kg	2.9 kg	2.9 kg
Warranty	3 Years	3 Years	3 Years
DAA modem	Yes	Yes	Yes
Op. System	Win 95/98	Win 95/98	Win 95/98
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Inc Tax	**$5,650**	**$6,150**	**$7,634**
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Op. System	Win NT 4.0	Win NT 4.0	Win NT 4.0
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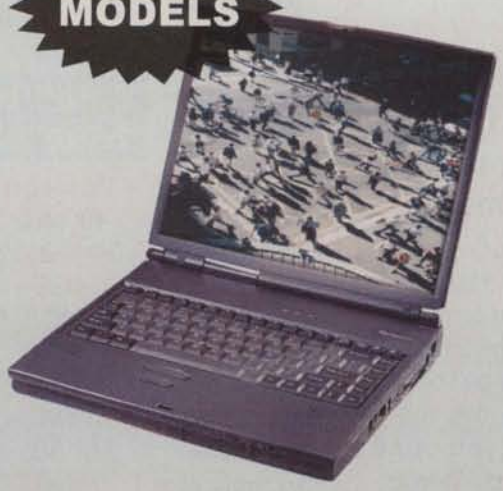

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TOSHIBA

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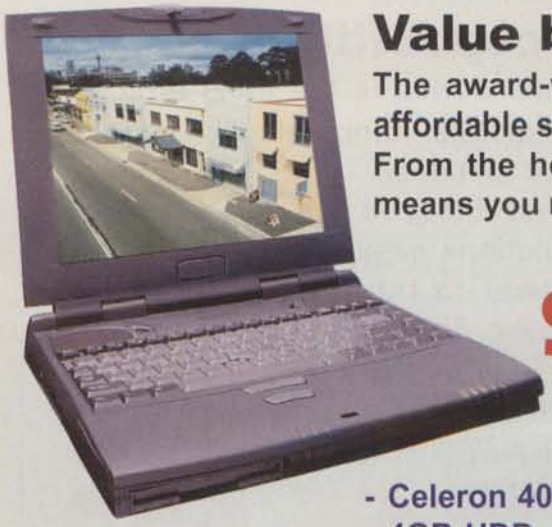
For Independent Types: Satellite



Value built-in

The award-winning Toshiba Satellite Series is a range of affordable small business or home office mobile computers. From the home to the office, the unique all-in-one design means you never have to leave functionality behind.

From (79064)

$2,995

Long Term Rent* T.A.P.**
$22.65 per week

- Celeron 400MHz
- 64MB RAM
- 4GB HDD
- 13.1" DSTN

NEW MODELS

Great Value

Now available with DVD!!

Toshiba

For corporate and government

Buying for your organisation? Harris can work with you to supply under 'bid' pricing for appropriate large volume needs. We can hold stock for you and configure to your needs. Call and ask for Colin Rigley on 1 300 13 9999.

Rental rates subject to conditions: to approved purchasers, rental figures shown are for 36 month terms. Please call us for the latest figures.

Model	Satellite 2590CDS	Satellite 2590CDT	Satellite 2590XDVD (with DVD!!)	Satellite 4090XCDT	Satellite 4100XDVD (with DVD!!)
Processor	Celeron 400MHz	Celeron 400MHz	Celeron 400MHz	Celeron 400MHz	Pentium II 400MHz
RAM Std/Max	64/192 MB	64/192 MB	64/192 MB	64/192 MB	64/192 MB
Hard Disk	4GB	6GB	6GB	4GB	6GB
Screen	13.1" DSTN	12.1" TFT	14.1" TFT	14.1" TFT	14.1" TFT
Display	800x600	1024 x 768	1024 x 768	1024 x 768	1024 x 768
CD-ROM	20x max.	20x max.	20x max.	20x max.	20x max.
Mic & Spkr	Yes	Yes	Yes	Yes	Yes
Battery Life	2.5+ hours	2.5+ hours	2.5+ hours	2.5+ hours	2.5+ hours
Port replicator	Yes	Yes	Yes	Yes	Yes
Select bay	No	No	No	No	No
DVD	No	No	2.4x	No	2.4x
Weight	3.1 kg	3.1 kg	3.1 kg	3.1 kg	3.1 kg
Warranty	1 Year	1 Year	1 Year	1 Year	1 Year
DAA modem	Yes	Yes	Yes	Yes	Yes
Op. System	Win 95/98	Win 95/98	Win 95/98	Win 95/98	Win 95/98
Rent 3 Yrs.**	$22.65/wk*	$26.65/wk*	$34.20/wk*	$32.46/wk*	$43.30/wk*
Inc Tax	**$2,995**	**$3,526**	**$4,525**	**$4,295**	**$5,730**
Part number	(79064)	(79066)	(78981)	(79067)	(79068)

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Options for Toshiba Notebooks

TOSHIBA EDO Memory Upgrades

32MB for Tecra 8000/ Portege 7000/ Satellite 4000	(29356)	$199
32MB for Portege 3110	(81078)	$205
64MB for Tecra 8000/ Portege 7000/ Satellite 4000	(29348)	$269
64MB for Portege 3020	(77229)	$595

TOSHIBA Battery Packs

For Satellite 4000/4010/2520CDT and others	(21930)	$129
For Portege 3010/3020 (Lithium Ion)	(73665)	$139
For Satellite 4000 Series	(72109)	$129
For Tecra 8000 (Lithium Ion)	(29358)	$278

TOSHIBA High Capacity Battery Packs

For Portege 3010/3020	(72475)	$278
For Portege 7000/7020	(66479)	$330

TOSHIBA Battery Charger

For Tecra 8000	(29357)	$489

TOSHIBA Universal AC Adapter

For Tecra 8000/Satellite 4000/4010 and others	(44200)	$134

TOSHIBA Additional 2 Year Warranty

For Satellites with TFT Display	(21729)	$182

TOSHIBA Docking Station

For Portege 7000/7010/7020	(65958)	$1,299

TOSHIBA Port Replicators

For Tecra II 750/780/8000	(79226)	$725
For Satellite 4030/4060/4080XCDT	(74088)	$345

TOSHIBA Desk Station V+

For Tecra 500/550/650/700/750/8000 Series	(25446)	$1,352

TOSHIBA Carry Bags

Toshiba Friend Carry Bag	(75901)	$78
Leather Bag for A4 Notebooks	(68408)	$205
Classic Leather Notebook Carry Bag	(79770)	$207
Hard Carrycase for A4 Notebooks	(01762)	$394

Want to know more?

For the latest pricing and information on these and many more Toshiba options, please check out the Web Direct Link. Or call the Harris Technology Call Centre staff. They are ready to answer your questions and help you make the right choice on 1300 13 9999.

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HP Jornada 820 Palmtop

- 8.2" VGA Screen (640 x 480 at 256 colours)
- 190MHz StrongARM RISC processor
- 16MB RAM (32MB max.)
- 16MB Burst Mode ROM
- Win CE 2.2
- Microsoft Pocket editions of Word, Excel, Powerpoint Outlook and Internet Explorer

(71162)

$1,699

Jornada 420

* Brilliant 256 colour display 240x320 pixel LCD, CSTN
* Hitachi SH7709a 32bit processor operating at 100MHz and 8MB RAM memory

(74453)

$963

Omnibook XE2

From: (81802)

$3,099

Rent* T.A.P.** for **$23.42** per week over 3 years

Celeron 366MHz Processor
32MB SDRAM
4GB HDD
12.1" TFT screen
24x CD-ROM drive
Windows 95/98

#	Processor	HDD	RAM	OS	Screen	Rent/Week	Price
(81802)	Cel 366	4.0GB	32MB	Win 95/98	12.1"TFT	$23.42	$3,099
(81803)	PII 366MHz	6.0GB	64MB	Win 95/98	13.3" TFT	$35.51	$4,698
(81804)	PII 366MHz	6.0GB	64MB	Win 95/98	13.3" TFT	$37.15	$4,898

Omnibook 900

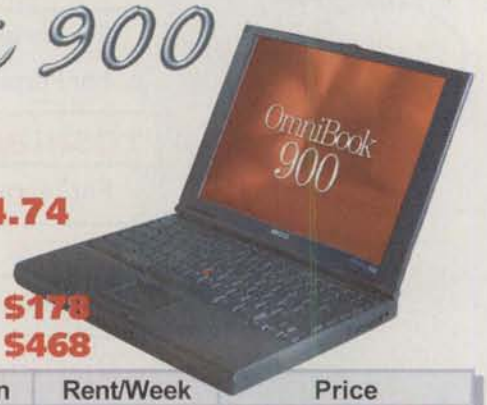
366PE-MHz Intel Pentium II
32MB SDRAM std
4 or 5.9 GB HDD
12.1" SVGA TFT screen
Optional CD-ROM drive
Full size keyboard, Dual Pointing Devices
32-bit PCI bus video & graphics controller
2.5MB Video RAM

From: (73317)

$4,597

Rent* T.A.P.** for **$34.74** per week over 3 years

Additional:
(62095) 32MB RAM **$178**
(65203) 24x CD-ROM **$468**



#	Processor	HDD	RAM	OS	Screen	Rent/Week	Price
(73317)	P II 366MHz	6.4GB	32MB	Win 95/98	12.1"TFT	$34.74	$4,597
(73313)	P II 366MHz	6.4GB	32MB	Win NT	12.1"TFT	$36.20	$4,790

Omnibook 4150

From (78625)

$4,379

300/366PE-MHz Intel Pentium II
64MB SDRAM std
4.8/6.4 GB HDD
14.1" SVGA TFT screen
16-bit Sound Blaster Pro compatible sound

Rent* T.A.P.** for **$33.09** per week over 3 years

#	Processor	HDD	RAM	OS	Screen	Rent/Week	Price
(78625)	P II 300MHz	4.8GB	64MB	Win 95/98	14.1"TFT	$33.09	$4,379
(78619)	P II 300MHz	4.8GB	64MB	Win NT	14.1"TFT	$34.38	$4,549
(76972)	P II 366MHz	6.4GB	64MB	Win 95/98	14.1"TFT	$45.31	$5,995
(76971)	P II 366MHz	6.4GB	64MB	Win NT	14.1"TFT	$47.57	$6,295

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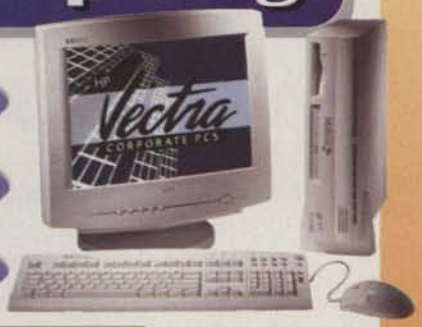


If you are looking for a top-performing corporate PC that's also easy to manage, the HP Vectra PC is the right choice for you. These award-winning desktop PCs lead the industry in making corporation IT environments highly manageable, stable and secure.

Product Number	Processor	RAM	Hard Disk	CD ROM Drive	LAN interface	Operating System	Part Number	Price*
D7856A	Pentium II 450MHz	32MB	4.3GB	Optional	✓	WIN95	(80449)	$1,659
D7857N	Pentium III 450MHz	64MB	8.4GB	24X Variable	✓	NT4.0	(75840)	$2,139
D8172N	Pentium III 450MHz	64MB	4.3GB	Optional	✓	NT4.0	(75831)	$1,849
D8173A	Pentium III 450MHz	64MB	8.4GB	32X	✓	WIN95	(75832)	$1,989

*Prices are without monitor. HP Ultra VGA 15" monitor: (73463) $529

*Prices listed on this page are ESP prices and are current at time of print. Prices are subject to change without notice.

HP Brio

Incl. 3 Yr Warranty

Now, more than ever, growing businesses can enjoy the latest PC technology at HP's best prices. HP Brio PC's come with additional features that assist growing businesses with everyday tasks, including the exclusive HP Brio Center for On-screen support.

Includes 17" monitor

Model: D8419A#801/D2837A
Processor: Celeron 466Mhz
RAM: 64MB
HDD: 4.3GB
CD-ROM: 32X IDE
LAN: Yes
Operating System: WIN98
$2,278 (81287+65211)

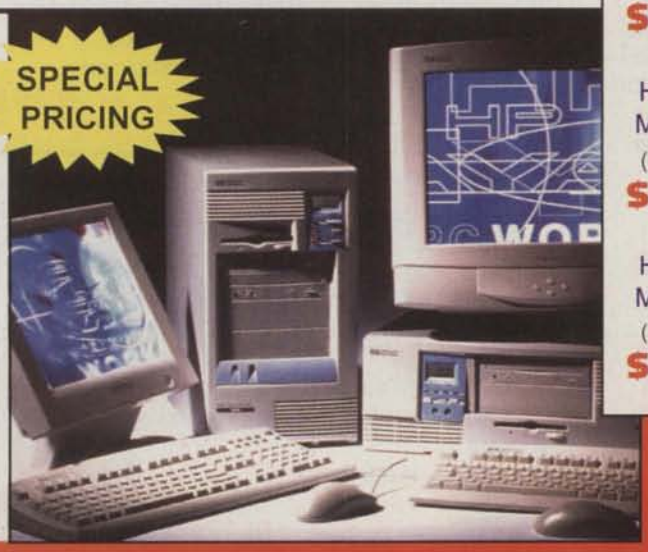
Model: D7636A#801/D2837A
Processor: Pentium III 450MHz
RAM: 64MB
HDD: 8.4GB
CD-ROM: 32X IDE
Graphics: Matrox MGA G200 AGP 2X, 8MBSDRAM
LAN: Yes
Operating System: WIN98
$2,797 (81647+65211)

HP Kayak

SPECIAL PRICING

Model: Kayak XA D6734N
Processor: Pentium III 500MHz
RAM: 128MB
HDD: 6.4GB UATA
CD-ROM: 32X IDE
Graphics: Elsa Gloria Synergy (AGP), 8MB SDRAM
LAN: Optional
Operating System: NT 4.0
(81526) **$3,129**

Model: Kayak XA-s D7984N
Processor: Pentium III 500MHz Dual Processor
RAM: 128MB
HDD: 9.1GB SCSI
CD-ROM: 32X IDE
Graphics: Elsa Gloria Synergy (AGP), 8MB SDRAM
LAN: Combo SCSI/LAN Card
Operating System: WIN NT 4.0
(76186) **$5,469**



HP 15" Monitor (72507) **$399**

HP 17" Monitor (65211) **$594**

HP 19" Monitor (78152) **$998**

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HP Servers & Networks

Easy to set up, back up, troubleshoot, and expand. The HP NetServer E 60 is clearly the best solution for businesses with little or no in-house IT support.

NetServer E60

HP E-60 Model 1 - Pentium II 400MHz

PII 400MHz, 64Mb SDRAM std. Whopping 9.1GB HDD. Dual-ch Ultra Wide SCSI Controller, LAN, CD-ROM. Super keyboard and mouse.

(76019) **$3,448**

HP E-60 Model 2 - Pentium II 450MHz

PII 450MHz, 64Mb SDRAM std. Whopping 9.1GB HDD. Dual-ch Ultra Wide SCSI Controller, LAN, CD-ROM. Super keyboard and mouse.

(76020) **$3,995**

Great Value!

HP E-60 Model 3 - Pentium III 500MHz

PIII 500MHz, 64Mb SDRAM std. No HDD (hot swap box). Dual-ch Ultra Wide SCSI Controller, LAN, CD-ROM. Super keyboard and mouse.

(76021) (Call for Hard Drive Options) **$3,995**

HP E-60 Model 4 - Small Business Pack

- **HP NetServer E60**: Intel® Pentium® II 400MHz, 64Mb, 9.0Gb HDD
- **HP ProCurve Switch 408**: 8 Port 10/100 Unmanaged Switch
- **HP SureStore DAT 8i Tape Drive**
- **HP 15" Monitor**
- **HP Support Pack:** 3 Year On-site warranty

(xxxxx) **$Call**

ProCurve

HP ProCurve 212M

12 x RJ-45 10BaseT ports, 1xRJ-45 autosensing 10/100 BaseT 1 x open 10/100 Mbps transceiver port

(75511) **$969**

HP ProCurve 224M Switch

Ideal for low-cost dedicated 10Mbps desktop switching for small to mediumsize groups of users.

- Ports: 24 x RJ-45 10BaseT ports, 1 x RJ-45 autosensing 10/100BaseT port, 1 x open 10/100Mbps transceiver port
- IP multicast software prevents flooding of multicast video traffic and supports QoS for IP multicast traffic
- Full duplex on all ports for maximum performance

(71576) **$1,379**

HP ProCurve 2224 Switch

Low-cost desktop switch ideal for delivering performance to workgroups with a mix of 10Mbps and 100Mbps devices and for migrating from 10Base-T to 100Base-TX:

- 24 10/100Base-TX autosensing ports
- One open transceiver slot
- Unmanaged
- Low, industry-leading price

(75515) **$1,715**

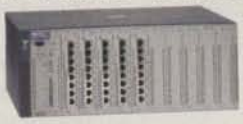
HP Procurve Switch 2424M

Desktop switch ideal for low-cost migration to 10/100 stackable switching:

- 24 10/100Base-TX autosensing ports
- Open module slot for Gigabit stacking and uplinks
- Managed
- Low, industry-leading price

(75513) **$2,680**

HP ProCurve 4000M Switch



A feature-rich, modular 10/100/Gigabit desktop switch that provides scalable, low-cost switching and all the benefits of HP Proactive Networking. Ideal for medium-to-large businesses looking for scalable, expandable, low-cost migration to 10/100/Gigabit switching to the desktop.

(66063) **$4,399**

Optional Gigabit Module for the above (76563) **$2,056**

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Ultra Portable Notebooks

PC-A500

- **Knockout** 12.1" SVGA with **NEW** Anti-Glare/Anti Reflection TFTDisplay
- **Whopping** 6.4GB Hard Disk Drive
- 333MHz Mobile Pentium® II Processor
- 20x Speed **Removable** CD-ROM Drive
- 64MB Standard Memory (192Mb max.)
- 1.98kg with CD-ROM Drive
- Highly durable magnesium body

$4,995 (81282)

- Monitor port for connection of external display equipment such as projector

Powerful Performance in a Compact Body -- The Sharp PC-A500 notebook computer incorporates the above features, along with: an easy to use keyboard with 2.5mm stroke and 18mm pitch, battery indicator displays the remaining battery charge even when the power is off. **Comes with BONUS Twister PCMCIA 56K fax/modem.**

PC-A250

$4,595 (76967)

AVAILABLE WHILE STOCKS LAST!

- 300PE MHz Mobile Pentium II
- 6.4GB Hard Disk Drive
- 64MB Memory (128MB max)
- Powerful performance in an ultra slim & compact body
- Newly developed 11.3" Anti-Glare Anti-Reflection TFT
- Built-in LAN 100Base-TX/10Base-T
- 6 hours of battery operation with optional add-on battery
- External Floppy Disk Drive with I/O Ports
- Versatile Expansion Capability
- Built-in connectivity for product enhancement and LAN interface
- Easy to use keyboard with 2.5mm stroke & 17mm pitch

AL-840

Digital Laser Copier, Printer

Super compact design

$1,445

(72921)

- True 600 x 600 dpi resolution
- 8 copies per minute
- Sharp's Single Scan System enhances productivity
- 2x Built-In Printer Interface
- 250 Sheet Rear Loading Paper Tray
- Letter or Legal Size Copying
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FO-175 Thermal Fax
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FO-780 Plain Paper Fax
Compact thermal Transfer
(77811)
$398

FO-2550CM Plain Paper Multi Function Centre
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(74347)
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The thin and powerful ThinkPad 600 notebook is a new breed of innovatively designed, reliable, easy-to-use mobile computers that translates form and function to new levels of sophistication. With a slim 36mm profile and travel configurations at approximately 2.3Kg, the stylish ThinkPad 600 is a truly perfect travel partner: maximum power, minimal weight, ingeniously designed for the way you work.

- Mobile Pentium II 300MHz
- 32MB RAM (288MB maximum)
- 4GB HDD
- 13.3" 1024x768 TFT - active matrix display
- PCMCIA support: 2 Type II or 1 Type III Card Bus
- CD-ROM 24x max
- Audio
- Fax/modem speeds: 56K
- Microsoft Windows 98 operating system

(75312) **$5,490**

- As above with Pentium 366Mhz , 64Mb RAM & 6.4GB HDD

Model 26454AA (75313) **$6,895**

Rent* T.A.P.** for **$52.10** per week over 3 years

ThinkPad 600E
Pentium II 400MHz
- 13.3" TFT display
- 10GB HDD
- 64MB SDRAM
- 56K Modem
- DVD-ROM Drive
- Windows® 98

(80244) **$7,449**
Rent* T.A.P.**
$56.29 / week / 3 yrs

ThinkPad 770Z
Pentium II 366MHz
- 14.1" TFT display
- 14.1GB HDD
- 128MB SDRAM
- 56K Modem
- DVD-ROM Drive
- Windows® 98

(76861) **$9,250**
Rent* T.A.P.**
$69.90 / week / 3 yrs

ThinkPad i-Series
Celeron 366MHz
- 12.1" TFT display
- 4.8GB HDD
- 32MB SDRAM
- 56K Modem
- 24xCD-ROM Drive
- Windows® 98

(78407) **$3,230**
Rent* T.A.P.**
$24.41 / week / 3 yrs

IBM Business Partner

IBM ThinkPad Deluxe Koskin Carry Bag (31987) **$176**

IBM Polyester Carry Bag (31986) **$57**

IBM Over-nighter Carry Bag (31989) **$176**

IBM Deluxe Leather Carry Bag (31990) **$187**

IBM ThinkPad CD-ROM Pouch (31991) **$20**

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IBM Business Partner

PC 300GL Celeron 466MHz

Small business series

- Celeron 466MHz
- Micro tower (4x4), PCI
- 64MB RAM standard (512MB maximum)
- 8.4GB Ultra ATA/66 HDD with S.M.A.R.T. III
- Graphics: Intel 810, 4MB and Direct AGP
- Slots and bays (total/available) 4 (3) x 4 (1)
- CD-ROM 40x max
- Audio: SoundMAX
- Microsoft Windows 98 operating system installed

Model 6278S5A without Monitor (82497)

$2,499

IBM 15" Monitor G-54 (65992)

$485

Now your business can enjoy IBM quality at a great price. Call for pricing on other models.

IBM PC 300GL

Model 6287 (76069)

Intel Celeron 433MHz
-
32MB RAM
-
4.2GB Ultra ATA with SMART HDD
-
2MB 64-bit S3 Trio 3D AGP Video Card
-
1 parallel port, 1 serial port, 2 USB ports
-
Windows 98
-
!!!
Does not include monitor

$1,465*

*Available while stock last

Great Value

IBM Business Partner

NetFinity 3000 Server

If your business is at the point where you need a server, but don't have a big budget, the IBM Netfinity 3000 is the affordabel solution. Packed with power and scalability features that support file-and-print serving, workgroup productivity applications and shared Internet access, the IBM Netfinity 3000 is the reliable network foundation you need.

- Pentium III 500MHz
- 9.1GB HDD Ultra Wide SCSI with S.M.A.R.T.
- 64MB RAM standard (768MB maximum)
- Maximum storage capacity 72.8GB
- 512KB Level 2 Cache
- CD-ROM 32x max
- 6x6 MiniTower
- Dial-in for control/monitoring/ remote management
- Dial-out for alert notifications
- Slots and bays (total/available) PCI/ISA 6 (5) x 6 (3)

Model 847650U (77555)

$5,395

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Dual Processor Capable

Upgradable to 600MHz CPU

Silicon Graphics 320

- SGI Single Pentium III CPU 450MHz
- 6.4GB Ultra ATA HDD
- Cobalt Graphics Engine
- 128MB ECC SDRAM
- Windows NT Workstation 4.0
- 32x CD-ROM EIDE
- 3 Years On-site Warranty, Next Business Day

Without Monitor: **$6,998**

With 17.3" Flat Panel Monitor: **$12,167**

Rent * T.A.P.** **$92** per week over 3 years

With 21" CRT Monitor: **$9,276**

Rent * T.A.P.** **$71** per week over 3 years

Quad Processor Capable

Silicon Graphics 540

- Single Pentium III Xeon CPU 550MHz
- 1 x 9.1GB Ultra 2 SCSI HDD
- USB Keyboard & 3-button mouse
- Window NT Workstation 4.0
- 32 x CD-ROM EIDE
- 256MB ECC SDRAM
- Stereo Speakers
- Cobalt Graphics Engine
- 3 Years On-site Warranty, Next Business Day

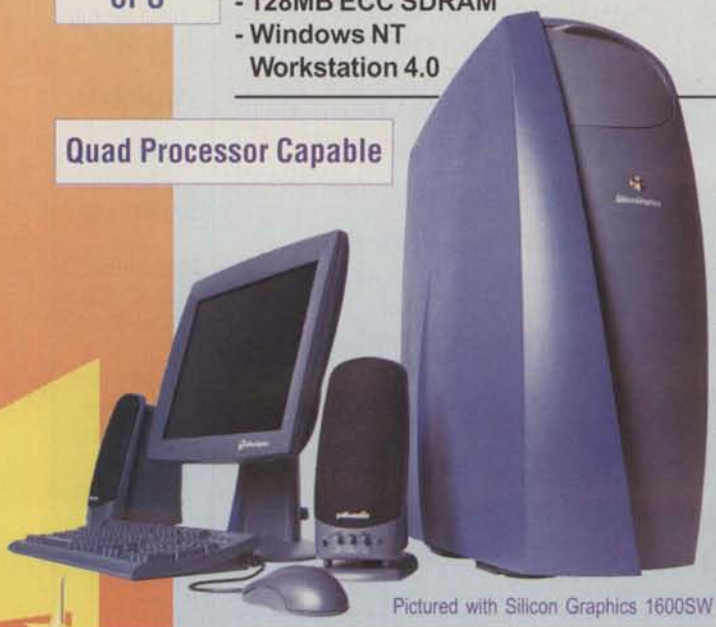
Without Monitor: **$14,607**

With 17.3" Flat Panel Monitor: **$19,786**

Rent * T.A.P.** **$150** per week over 3 years

With 21" CRT Monitor: **$16,889**

Rent * T.A.P.** **$128** per week over 3 years



Pictured with Silicon Graphics 1600SW Flat Panel Monitor

Rental Plan subject to Approved purchasers. Rental figures shown are for 36 month terms. Please call us for latest figures. We can obtain fast approvals.

What makes the Silicon Graphics Difference?

Integrated Visual Computing Architecture (IVC) provides a tightly integrated combination of lightning-quick graphics processing, huge interconnects, and high-capacity graphics memory to move and process visual data at 3.2 GB/sec.

Cobalt Graphics Chipset, the heart of the Silicon Graphics 320 and 540 systems, includes high-performance 2D and 3D graphics processing, S-video, composite video, CD-quality audio, USB, and IEEE-1394, the 320 has three available PCI slots (540 has 6 available PCI slots) on two PCI-64 buses. Other features of the Cobalt™ graphics chipset which provide the stunning graphics performance include:

* Hardware acceleration of 3D geometry, lighting, transforms, texturing, rendering and rasterization functions
* Dynamically allocated memory that supports almost 1GB of texture memory
* Extremely fast pixel fill
* Real-time transfer of two simultaneous streams of video I/O
* Support for resolutions up to 1920x1200 (24-bit double buffered)

SGI Systems have been designed with these applications in mind

3D Modelling: Creating & manipulating complex 3D models call for staggering amounts of system resource which only SGI systems can deliver.

Image editing and Manipulation: High resolution 2D images are becoming popular in DTP, only SGI systems have capabilities to handle this.

Video Editing: Silicon Graphics 540 Visual Workstation supplies the professional video interfaces & high systems bandwidth needed to work with un/compressed analog & digital video in real time.

Analysis: Silicon Graphics 540 Visual Workstation provides analytic capabilities far beyond most personal workstations. No other system has the power of an SGI.

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High Performance Servers with Style

SGI 1400M Server for Windows NT 4.0

Scalable server that exceeds requirements for certification by Microsoft's worldwide hardware quality lab

- 1x 500MHz Pentium III Xeon Processor (Quad processor capable, 550Mhz also available)
- 256MB ECC Memory (max 4GB)
- 9GB Ultra 2 SCSI Disk
- Windows NT 4.0 Server
- 6x Ultra2 SCSI hot-swap drive bays
- 7x PCI slots on 2 buses
- 19 Inch rack-mountable
- High availability features: hot-pluggable disk drives, emergency management port, visual indicators for component health, redundant fan and power supplies, ECC memory
- Robust management and monitoring options, including Intel server control and SNMP support

SGI 1400M: **$17,875**

Rent * T.A.P.** per week over 3 years: **$135**

Some of the awards SGI products have earned

1600SW Flat Panel Monitor:

- **MVP Award** PC Computing
- **Top 100 Products** VAR Business
- **Wired for 3D** 3D Design

320 & 540 Visual Workstations:

- **Best of Show Award** Spring Comdex
- **Best New Product of the Year** FOSE '99

Silicon Graphics 1600SW Flat Panel Monitor

You'll never look at a monitor the same way again.

High resolution 17.3" 1600x1024 LCD monitor. 16.7 million colours (24-bit true colour; no dithering). Unique SuperWide screen displays two full pages. Supports ColorLock colour calibration. Ultrafine dot pitch (0.23mm) for professional quality image editing (110dpi). Fast pixel response for video playback. Dimensions incl. base: 17.8"W x 18.3" H x7.3" D, 7.2Kg.

17.3"

With PCI Graphics Card:

(75447) **$5,893**

Rent* T.A.P.** **$45**/week/3 yrs

With AGP Graphics Card:

(75448) **$5,893**

Rent* T.A.P.** **$45**/week/3 yrs

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Options

RAM upgrade to 64MB (28264) **$75**

RAM upgrade to 128MB (73256) **$230**

Hard Drive Upgrade to 6.4GB Ultra DMA (28266) **$40**

Hard Drive Upgrade to 13GB Ultra DMA (80042) **$160**

CD-ROM 40x Internal IDE (80063) **$115**

6x Internal DVD-ROM and software DVD Player (79428) **$210**

Compucon AMD

(77296) **$1,124**

Compucon AMD unit with the following:
- **AMD K6-2 350MHz Processor**
- 4.3GB Hard Disk Drive
- 4MB AGP Graphics Card (ATI Rage)
- 1 x AGP, 4 x PCI and 2 x ISA Slots
- 2 Serial, 1 Parallel & 2 USB Ports
- PS/2 104-key Keyboard
- PS/2 Wheel Mouse
- Windows 95 or 98
- 32MB SDRAM
- Midi-Tower Case
- 1.44 Floppy Disk Drive
- 10MB Combo Network Card
- 3 Years On-Site Warranty

This system with 15" Compucon Multimedia Monitor: **$1,454**
Monitor price is **$330** (25874)

Intel Celeron

(82012) **$1,159**

Compucon Celeron unit with the following:
- **Intel Celeron 400MHz Processor**
- 4.3GB Hard Disk Drive
- 4MB AGP Graphics Card (ATI Rage)
- 1x AGP, 3x PCI and 1x ISA Slots
- 2 Serial, 1 Parallel & 2 USB Ports
- PS/2 104-key Keyboard
- PS/2 Wheel Mouse
- Windows 95 or 98
- 32MB SDRAM
- Midi-Tower Case
- 1.44 Floppy Disk Drive
- 10MB Combo Network Card
- 3 Years On-Site Warranty

This system with 15" Compucon Multimedia Monitor: **$1,489**
Monitor price is **$330** (25874)

Intel Pentium III

(82081) **$1,499**

Compucon Pentium unit with the following:
- **Intel Pentium III 450MHz Processor**
- 4.3GB Hard Disk Drive
- 4MB AGP Graphics Card (ATI Rage)
- 1x AGP, 4x PCI and 3x ISA Slots
- 2 Serial, 1 Parallel & 2 USB Ports
- PS/2 104-key Keyboard
- PS/2 Wheel Mouse
- Windows 95 or 98
- 32MB SDRAM
- Midi-Tower Case
- 1.44 Floppy Disk Drive
- 10MB Combo Network Card
- 3 Years On-Site Warranty

intel inside pentium II

This system with 15" Compucon Multimedia Monitor: **$1,829**
Monitor price is **$330** (25874)

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Palm IIIe

One Touch Organisation

Imagine having your daily schedule, important phone numbers, lists, meeting times and more in one organized place. It's easy and affordable with a new Palm IIIe™ connected organizer. And, at just 4.7" tall and a mere 6 oz., it can go wherever you go - be it work, home, school or on vacation. Say goodbye to your bulky paper planner. The Palm IIIe™ connected organizer is an easy-to-use, pocket-sized way to keep track of your busy life. Choose from thousands of add-on applications. Internet ready. HotSync® cradle included. Stores approximately:

- 6,000 addresses
- 5 years of appointments
- 1,500 to-do items
- 1,500 memos
- 200 e-mail messages
- and lots of third-party applications.

(81158) **$449**

Palm IIIx

More of a good thing

The Palm IIIx™ organiser gives you twice the memory of the Palm III™, and an open connector slot for room to expand. New advanced LCD screen technology improves viewing in dim light conditions or bright sunlight. Stores approximately:

- 12,000 addresses
- 5 years of appointments
- 3,000 to-do items
- 3,000 memos
- 400 e-mail messages
- and lots of third-party applications.

(74373) **$720**

Intellisync Software 3.1

Excellent Conduit software to work with the Palm IIIx. Enables users to sync their PalmPilot organizer with common personal info management, contact management and group scheduling applications.

(65266) **$145**

Palm V

Slim, sleek and elegant

Sleek design, anodised aluminium case. Only half the thickness of a Palm III. All your names, addresses, phone numbers, appointments, to-do's and email messages right at your fingertips. Recharge in minutes a day. And, a full charge lasts for up to a month. Stores approximately:

- 6,000 addresses
- 5 years of appointments
- 1,500 to-do items
- 1,500 memos
- 200 e-mail messages
- and lots of third-party applications.

(74294) **$849**

Palm Slim Leather Case
(63801) **$49**

Palm III 3-pack Styli
(60675) **$20**

Palm III Cradle
(60673) **$60**

Palm V Cradle
(74669) **$99**

Palm V Leather Belt Clip Case
(74673) **$50**

Palm V Modem
(74668) **$345**

Palm V Hard Case
(74676) **$75**

Palm V Travel Kit
For charging and synchronising without a cradle. HotSync cradle, plug adapters and AC charger
(74677) **$110**

PalmPilot/Palm III series/Palm VII PalmGlove
Shock-absorbent, water-resitant neoprane. Black:
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Also available: purple, olive, royal blue, teal and yellow

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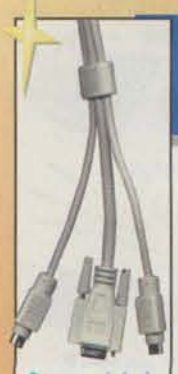
Multi-Server Controller



ServerLink to computer cable
Each end of the cable fans out into three connectors.

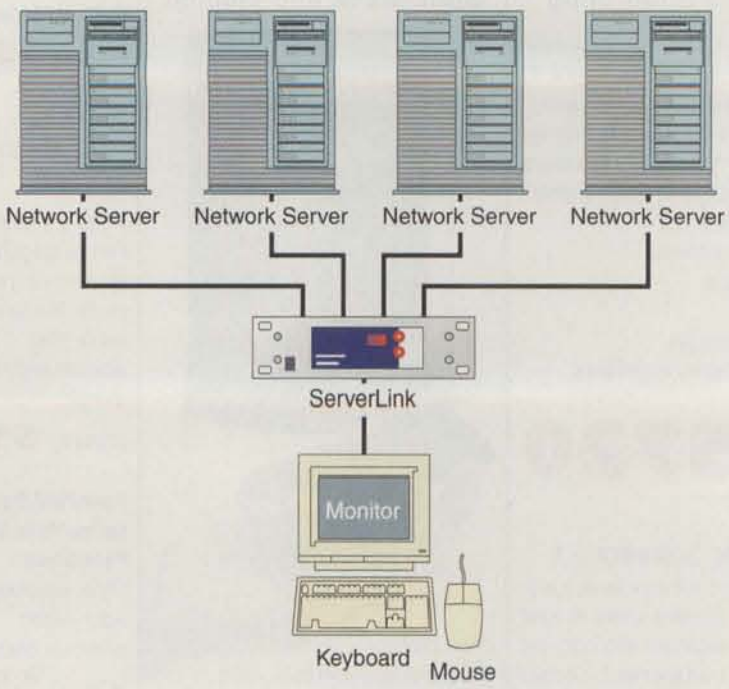
2m cable for **PS/2** mouse, keyboard and monitor (63972)
$17
5m cable (63976)
$76

2m cable for **AT/Serial** mouse, keyboard and monitor (63974)
$17
5m cable (63977)
$76

Control up to 256 network servers with a single monitor, keyboard & mouse

With a ServerLink you can monitor and fully control up to 256 network servers with just one monitor, keyboard and mouse. Save money on expensive monitors, create more working space and cut down on your power costs.

Designed and manufactured in Australia by an award winning engineering company, ServerLink is packed with features, providing total control of your ever expanding network.



- Select servers via On-Screen-Display
- Name servers for simple selection
- Mouse & keyboard emulation for flawless booting
- Scan Mode for periodic server monitoring
- Supports PS/2 and Serial mouse emulation
- Only one physical mouse required to operate both PS/2 and Serial Servers
- Backup power feature eliminates system power failure
- EPROM upgradable for future technology
- 8 and 16 port models 19 inch rack mounted design

Pop-up Screen Menu Control

- **Available in 4, 8 and 16 port models**
- **3 Year warranty**
- **Australian made**

ServerLink™

Multi-Server Controller

From
$470
(71652, 4-port PS/2)

ServerLink™

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Xircom PortStation - Port Expansion System

The simple way to connect your Windows computer to virtually any number of devices. Connect printers, scanners, digital cameras, keyboards, mice and more. Image the ease of installing all your devices via one standard USB plug!

Supports all makes and models of Windows** computers with USB ports

Connects virtually any parallel, serial and USB devices

Interlocking "mix-and-match" modules can be added or removed at any time

Simply add or remove devices without reconfiguring or rebooting your computer

Modules snap into system for quick and easy installation

1. Choose the modules you need to connect devices to your computer.
2. Snap modules and end caps together.
3. Attach devices to PortStation modules.
4. Connect PortStation to your computer's USB port.

PortStation Modules	
End Caps	(82215) **$229**
7-port USB Hub Module: Adds 7 USB ports for printers, keyboards, mice, storage devices, etc.	(82217) **$245**
Parallel DB-25 Module: Adds one parallel port for printers.	(82218) **$150**
Serial DB-9 Module: Adds two serial ports for mice, handheld PDA cradles ext. modems etc.	(82219) **$270**
Serial PS/2 Module: Adds two serial ports for mice, keyboards, etc.	(82220) **$157**
Ethernet 10 Module: Provides connection to 10Mbps Ethernet networks.	(82221) **$233**
Modem 56 Module: Provides high speed 56K* modem connection.	(82222) **$324**
PortStation Kits (include end caps, AC power adapter and USB cable)	
USB Hub Starter Kit: 7-port USB Hub module	(82223) **$305**
Connection Starter Kit: 4-port USB Hub + DB-25 + Serial PS/2 modules	(82224) **$396**
Office Communications Starter Kit: DB-25 + Serial PS/2 + Ethernet 10 modules	(82225) **$436**

CompactCard™ Ethernet

(80166) **$275**

1. Slide in CompactCard
2. Attach Connector
3. Snap in LAN cable

Innovative Windows CE connectivity solution provides high speed, enterprise-wide E-mail access, Internet browsing and data synchronisation. Connects Windows CE hand-helds to 10Mbps Ethernet Networks • Rapidly synchronise and exchange data anywhere on the LAN at speeds nearly 200 times faster than a 56K serial connection. Low Power operation. Quick and easy installation.

CompactCard™ GSM

Call for pricing on the unit that best suits your phone.

1. Slide in CompactCard
2. Attach Cable
3. Ready for wireless communication

Innovative connectivity solution provides Windows CE users with wireless data communications via GSM phones. Send and receive E-mail, browse the Internet, and fax over a digital wireless GSM link at speeds up to 9600bps. Send & receive messages up to 160 characters. Synchronise your Windows CE handheld with Windows-based PCs from anywhere in the world.

Xircom RealPort Value 56 Modem

High speed 56K modem functionality for notebooks. All connectors are integrated into the card providing a robust, reliable and easy-to-use solution. No cables to lose, no moving parts to break.

(72923) **$255**

Xircom RealPort Ethernet 10/100 + Modem 56K

Combines 10/100Mbps Ether-net, 56K modem, GSM, AMPS cellular and ISDN connectivity, in a single cable-free Integrated PC Card. GlobalACCESS™. GSM upgradeable.

(61795) **$619**

Xircom RealPort Ethernet 10/100

High-performance 10Mbps and 100Mbps Ethernet connectivity for the most reliable access to information while in the office. Full-duplex Ethernet at 10Mbps.

(67216) **$290**

*server download speed

**Win95 OSR2.1 (version 950b or 950c), Win98, WinNT 4.0 (SP3 and above) or Win2000

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Power Back Up = Power Protection

Back-Ups for budget PC's!

300va **$199** (56229)

500va **$230** (56230)

650va **$298** (56231)

Power-Chute® *Plus*

Software for standalone PCs which will shut down Windows, SMART drive and all Windows applications gracefully in the event of an extended power failure.

for Windows® **$94** (42950)

for Win NT **$129** (19558)

APC Symmetra

Power Array 8kVA, exp. to 16kVA

$14,990 (71087)

So good we use it ourselves!

APC Back-UPS Pro®

For home and office PCs

Smart battery backup and high performance surge suppression for Windows 95 and NT PCs

- PowerChute® Plus software lets your UPS shut down your applications gracefully in the event of an extended power failure
- Additional outlet for protection of printers
- Audible alarms
- Phone/modem protection
- User replaceable, hot swappable batteries

APC Back-UPS Pro **280si** (76636) **$325**

APC Back-UPS Pro **420si** (76637) **$399**

APC Back-UPS Pro **650si** (76638) **$529**

APC Smart-UPS®

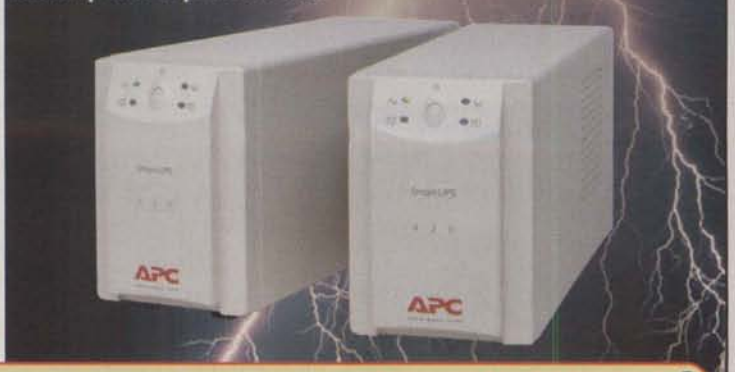
For small office servers

- Instantaneous power from the Back-UPS prevents data loss caused by outages and brownouts
- Includes APC PowerChute® Plus software
- Hot-swappable, user-replaceable batteries
- SmartBoost™ /SmartTrim™ for maximum on-line operation from 156-300 volts
- Three battery back-up/surge protection outlets
- One surge outlet for printer, fax, scanner etc.
- 10 Base-T/100 Base-TX network protection

APC Smart-UPS **420** (67199) **$512**

APC Smart-UPS **620** (67198) **$665**

Protects your data by supplying network-grade battery backup when power fails



See the APC Web based sizing guide to help you select the appropriate UPS: **www.apcc.com**

APC PowerStack Power Protection®

For hubs, switches, routers

PowerStack models take up only 1U of rack space to protect internetworking equipment in racks where space is at a premium

- Rackmountable (1U)
- Regulates low quality power for continued on-line operation
- User replaceable, hot swappable batteries
- Powers up to 4 devices
- PowerChute® Plus software

PRICE DROP

APC PowerStack **250** (78992) was **$689**, now only **$499**

APC PowerStack **450** (78991) was **$865**, now only **$629**

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Small-Medium Business Networks

D-Link DM-560

56K Fax/modem PCMCIA card V.90 and K56flex

- PCMCIA Type II Release
- Full plug in and Play
- Low power consumption
- Data compression and error correction
- Windows 95,98 and NT compatible
- C-Tick and ACA Approval
- The card is equipped with processors and memory to perform fax modem transmission, alleviating the host computer's CPU workload while freeing up its memory.

(61678) **$160**

Also available: Network Adapters

DMF-560TX Fast Ethernet Fax Modem 10/100 PCMCIA	(72787)	$395
DE-660CT PC Card 10Mb with RJ-45/BNC connectors	(35862)	$115
DFE-530TX PCI bus dual speed 10/100Mb network card	(62956)	$59
DFE-570TX 4 port PCI-bus 100Mb Fast Ethernet Server Interface card 4x200Mbps	(72786)	$567
DFE-650TX PCMCIA dual speed 10/100Mb network card	(56301)	$179
DFE-660TX 32-bit PCMCIA PC-CardBus dual speed 10/100Mb	(69449)	$189

D-Link USB Range

New from the D-Link USB Range:

These Universal Serial Bus hubs connect up to four USB peripherals or devices to their USB-ready PC. It provides out of the box industry standard Bus. It allows PC users to expand the number of USB ports on their systems.

DU-A2 - PCI Port USB Adapter	(78987)	$56
DU-H4 - 4 Port USB Hub	(79131)	$75
DU-H3SP - 3 Port USB Hub	(78989)	$159

Also available: Non USB Hubs

DE-809TP 9-port Mini-Hub 9x UTP with Uplink Capability	(32350)	$155
DE-809TC 9-port 10Mb Hub with 1 Coax port	(10388)	$135
DE-816TP 16-port 10Mb Hub with 1x AUI/1x BNC Ports (Rackmount)	(51844)	$295
DFE-904 4-port 10/100Mb Dual Speed Hub	(72789)	$185
DFE-905 Fast Ethernet Network Kit	(76617)	$289
DFE-908DX 10/100Mb 8-port Stackable dual speed hub	(60558)	$329

D-Link DES-1016

D-Link DES-1016 Switch is designed to enhance workgroups performance while providing a high level of flexibility. The DES-1016 allows users to either connect 10Mb or 100Mb connections and boost response time and bandwidth.

- 16 port 10/100M dual speed
- Support Full/ Half duplex
- Supports VLAN and port trunking

(69456) **$1,198**

Also available: Switches

DES-810 10 port Fast Ethernet Switch with 8x10BaseT, 2x100BaseTX	(53717)	$815
DES-815 16port Fast Ethernet Switch with 12x10BaseT, 3x100Base ports	(52206)	$899
DES-1008 8-port dual speed 10/100Mb Smart Switch	(52207)	$635
DES-1024 24 port dual speed 10/100Mb Smart rack mount Switch	(76740)	$1,667
DES-3224 24 port dual speed Managed rack mount Switch	(69457)	$3,275

D-Link RAS Range

Dial-up Router, Internet Server plus Remote Access Server.

- Simultaneously shares 1, 2, or 4 modems with regular phone lines
- Connect your entire network to the Internet with only one ISP account
- Let remote users access your LAN for email, the Internet etc

DI-510 1 x WAN, 1 LAN Port ISIP* Router	(79398)	$425
DI-540 4 x WAN, 1 LAN Port ISIP* Router	(79400)	$1099
DI-524 2x WAN, 5 Port hub	(79399)	$799

* Internet Server IP

Also available: Print Servers/Routers/Modems

DP-300 Dual Speed 10/100Mbps Multiprotocol Print Server 2 Parallel 1 Serial	(53598)	$450
DP-802 DP-802 Internet and Print Server	(78985)	$555
DP-101 1 Parallel port 10Mb Multiprotocol Print Server	(70076)	$239
DP-602 Internet Server	(81535)	$465
DFM-560I Internal 56K Voice/Data/Fax modem Rockwell Chipset	(65473)	$95

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- Provides performance close to that of an internal hard drive
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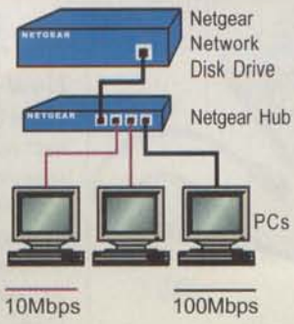
Are you running out of space?



model ND 508 — 8GB — (79013) **$1,225**

model ND 520 — 20GB — (79014) **$1,927**

Add extra Hard Drive capacity to your network with Netgear Network Disk Drives!

NETGEAR Network Disk Drives are the first information appliances to use high speed networking technology to simplify the use and installation of storage space on the network. By using a high speed network instead of adding internal hard drives you can add disk capacity for storing customer files, pictures, applications, or any other data quickly & easily.

Gigabit Switches

The FS509 and FS518 high-performance Fast Ethernet Gigabit switches provide a cost effective way to instantaneously boost network performance. Secure the power of Gigabit Ethernet to speed up server and backbone access. Automatic speed & full/half duplex sensing.

NORTEL NETWORKS

model FS 509 (76840) **$1,779**
Eight switched 10/100 Mbps ports + one 1000Mbps port (Gigabit E'net uplink)

model FS 518 (81514) **$2,917**
Sixteen switched 10/100 Mbps ports + two 1000Mbps ports (Gigabit E'net uplink)

The GS504 Gigabit Fibre Switch is a high performance network switch that provides back-bone connectivity for power work-groups, data centers, and server farms.

model GS 504 (81515) **$3,215**
Four full-duplex Gigabit fiber ports

Netgear offers free, 24-hour phone support

Check the Web Direct Link for the latest pricing and availability on these and other Netgear products. And why not register on-line for even better pricing?

Delivery Australia-wide

Fibre Switches

NETGEAR FS566 and FS562 Fibre Switches provide a simple, plug-and-play solution for extending your Ethernet LAN over distances that can't be achieved with traditional networks. By integrating high speed fibre with dual-speed Ethernet switching technology, these high performance switches allow your network to reach distances of up to 2km without any loss in performance. Features:

Automatic speed and full/half-duplex sensing - MDI uplinks - Network backbone performance - Rackmountable - Easy plug-and-play installation

model FS 562
6 Switched 10/100Mbps Fast Ethernet ports with 2 100Mbps Fibre Ethernet ports
(81516) **$1,980**

model FS 566
6 Switched 10/100Mbps Fast Ethernet ports with 6 100Mbps Fibre Ethernet ports
(81518) **$2,930**

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Take the Work out of Networking

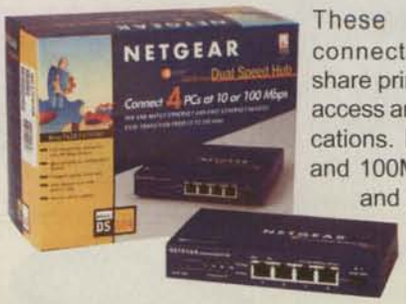
10Mbps Ethernet Hubs

Vista jacks with built-in LED indicators • Uplink port for network expansion • Slim, sturdy metal case design • BNC/AUI backbone support • Limited lifetime warranty • Easy Plug and Play installation

EN 104TP	4-port Slimline	(53456)	$74
EN 108TP	8-port Slimline	(53458)	$116
EN 116	16-port Slimline	(53459)	$225
EN 516	16-port Rackmount	(17425)	$250
EN 524	24-port Rackmount	(17435)	$330

- 16 or 24 10BASE-T ports
- Easyplug-and-play installation
- Vista network port with built-in LEDs
- BNC/AUI backbone support
- Internal power supply

Dual Speed Hubs



These Netgear hubs connect multiple PCs to share printers, files, Internet access and e-mail communications. Mix and match 10 and 100Mbps PCs, servers and peripherals on the same net-work with ease and without the high cost and complexity of multiple hubs and bridges. All feature easy, plug-and-play installation, Auto-sensing dual speed ports & vista network ports with built-in LEDs.

DS 104	4-port Slimline	(70795)	$218
DS 108	8-port Slimline	(18755)	$349
DS 116	16-port Slimline	(81519)	$484

Full connectivity among devices. Compact, sturdy, metal case.

DS 524	24-port Stackable	(69474)	$999

Stack up to 8 hubs via provided cascade cables.

10/100Mbps Fast Ethernet Switches

The Netgear FS104 and FS108 feature 4 or 8 switched 10/100 Mbps ports, auto-speed and duplex mode sensing. Versatile and compatible. Compact and easy to install. Vista jacks with built-in LEDs.

FS 104	4-port Slimline	(55171)	$347
FS 108	8-port Slimline	(70905)	$425

The Netgear FS 516 and FS524 switches provide powerful, network center performance with all 16 or 24 ports capable of 10 or 100 Mbps, half- or full-duplex operation, automatic speed sensing. Ideal for segmenting networks into small, connected subnets. Vista network ports with built-in LEDs.

FS 516	16-port Slimline	(60522)	$1,419
FS 524	24-port Slimline	(77549)	$1,615

Analog Modem Router

model RM 356

(70197) $627

Connect multiple PCs to the Internet easily

Provides shared Internet access in a box. Small offices/ home users can connect multiple PCs to the Internet with a single connection, using one ordinary phone line and one Internet Service Provider account.

Router + integrated 56K modem + integrated 4-port 10BaseT hub • DHCP server • Dynamic NAT+ • Dial-on-Demand-routing • Hi/fn (STAC LZS) compression • Five year warranty

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model RT 328

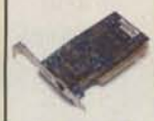
(68900) $683

Home office Internet access in a box. Includes built-in ISDN TA, 128 MultiLink PPP, DHCP Server, Dynamic NAT+, Dial-on-Demand Routing.

NETGEAR

FA310 Ethernet Adapter. 10/100 PCI (Speed sensing,PnP) (53460) **$65**

FA310 10-pack Save money! (75734) **$465**



FA410 PCMCIA Network Card (60071) **$170**

FA510 PCMCIA Network Card (81522) **$175**

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Jaz 1GB disk 3-pck (32844) **$496**
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Jaz 2GB disk 3pck (57271) **$519**
Jaz Jet - PCI SCSI controller (31591) **$195**
Jaz PCMCIA SCSI card (44744) **$218**
Jaz cable converter (46306) **$27**
Jaz universal power supply (35154) **$58**
Jaz Traveller (32860) **$89**

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(78902) **$369**

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Clik! Battery	(78920)	**$89**
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Zip 250MB disks 10-pack	(74452)	**$319**

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HP SureStore 8200i CD Writer

Model:	7510e EXTERNAL PARALLEL	8200i INTERNAL IDE
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Read:	6x	24x
Write:	2x	4x
Re-Write:	2x	4x
	NEW LOW PRICE	NEW LOW PRICE
Software:	• Adaptec DirectCD	• Adaptec DirectCD
	• Adaptec Easy CD Creator	• Adaptec Easy CD Creator
	• HP Fast Format	• HP Fast Format
	• HP Simple Trax	• HP Simple Trax
	• HP Disaster Recovery	• HP Disaster Recovery
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*Megahertz 56K Global modem with XJack connector (73899) - Capable of receiving downloads at up to 56Kbps and sending at up to 31.2Kbps. Actual download speeds you experience may be lower due to varying line conditions. Requires compatible analogue phone line and server equipment.

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3Com Etherlink 10/100 Cardbus PC Card with XJACK® (74695) **$299**

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OfficeConnect® hubs are designed for scalability: you increase port density only when you need it. As your business grows your OfficeConnect network can expand easily by connecting additional devices.

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TP4 COMBO	(39541)	$168

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The 3Com OfficeConnect networking kits include everything you need to network two or more personal computers including NICs, hubs, cables and complete easy to use documentation.

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Kit includes:
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- Two EtherLink III ISA 10BaseT NICs
- Two 0.76m UTP cables
- An external power supply

OfficeConnect SME 3-User Kit (57134) **$378**

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- Three 1.52m UTP cables
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OfficeConnect Fast Ethernet Switches

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OfficeConnect Switch 400	(67221)	$646
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Megahertz® 56K Global Modem PC Card with XJACK® Connector

Hassle-free access and high-speed downloads anytime, anywhere

(73899)

$329

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$187 (Pictured is USA model)

56K Fax Modem (63833)

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56K V.90 Voice Fax Modem (61303)

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56K Professional Message Modem (70928)

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Part Number:	(81339) White	(81341)	(81344)	(81342) White	(81345) White	(81348) White	(81350)
Description:	Full range powered monitor speaker pair	Multimedia speaker pair	3-piece Satellite speaker/ subwoofer kit	Bookshelf PC speaker pair	3-pce powered multimedia speaker/subw. kit	Powered subwoofer	Powered subwoofer wooden cabinet
Watts:	2x5w	2x10w	2x5w, 15w subw	2x20w	80w, 40w subw	15w	25w
Features:	Ashtonishly deep bass response	DSP chip for enhanced presence	Natural sound quality	Non-resonant wood fiber	USB, Satellite speakers	Universal compatibility	Incredible audio depth, auto on/off
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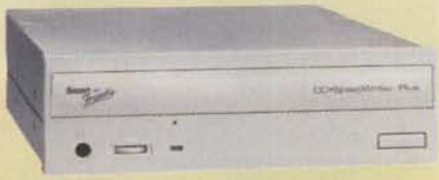

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G400 - Extreme Speed Plus:

- Environment mapped bump mapping - a sensational 3D feature. Only card to support this!
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- Amazing! Look at www.matrox.com/g400/applications/dual/home.htm for many interesting uses
- The G400 has stunning on screen visual quality
- Offers excellent DVD and TV out ability
- Upgradable to video capture & video editing (TV, VCR, PC Output)

Matrox Millennium G400

G400 Dual Head 32MB RAM	G400 Dual Head 16MB RAM	G400 Max Dual Head 32MB RAM
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Experience the full richness of CDs, MP3, and multimedia. Innovative compact design delivers realistic, high-definition sound for PCs, portable CD players and TV.
High-definition sound with solid bass • Excellent for CD music, Internet and MP3 audio • 3-year product warranty

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(81656)
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(69969)
$185

QuickCam Pro USB:
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$263

Parallel:
(70565)
$265

Cordless MouseMan Wheel 4-button
(78677)
$122

Cordless Desktop Keyboard & Mouse
(57187)
$229

Internet Keyboard
(60332)
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TrackMan Live Wireless PC Controller
(77753)
$259

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North Sydney

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Tektronix

Web Direct www.ht.com.au/cat/tektronix

Business Laser Printing

For Phaser 740:
Black toner (6,000 pg) (71854)
$197

C,M or Y toner (71855, 71856, 71857)
$386

16MB memory (71844)
$439

32MB memory (71845)
$875

For Phaser 840:
Colour Ink Sticks (C,M or Y) 2-pack (71872, 71873, 71874)
$194

5-pack (71869, 71870, 71871)
$399

Paper Tray (71905)
$234

16MB Memory (71844)
$439

32MB Memory (71845)
$875

Phaser 740 Laser Printer

740L Colour-Capable Laser Printer

740 Colour Laser Printer

Should I get a black & white or colour printer? Yes.

740L: Incredibly affordable high-performance black & white laser printer, colour capable. Step up to colour by simply by adding the Colour Upgrade Kit (75277)

Never Say Never...

740: Affordable colour laser printer with extraordinary print quality. For breathtaking images that leap off the page, at a breakthrough colour laser price, look to the Phaser 740. That way, you'll never have to compromise.

Model	740L (71835)	740 (71836)
Full colour printing	add colour kit	standard
Max resolution black/colour	1200dpi/ -	1200dpi/600dpi
Ram Standard/Max	16MB/256MB	32MB/256MB
Image processor	133MHz	133MHz
Print speed black/colour	16ppm/ -	16ppm/5ppm
Pipeline printing	optional	optional
Duplex manual	standard	standard
Duplex auto	optional	optional
Price	**$3,678**	**$4,798**

Both printers feature: 10BaseT for network-ready printing right out of the box • No developers or other special components that need regular service • Adobe Postscript 3

Phaser 840 Colour Printer

The Phaser 840 solid-ink colour laser printer is a winning combination of easy to use, cost-effective colour printing, quality, and staggering colour print speeds.

Set up is breeze with its "plug-and-print" right-out-of-the-box design.

And.., **free black ink** means you can add colour to documents and still keep the same low cost-per-page as a monochrome laser printer. Colour is now affordable!

Model	840/N (71839)	840/DP (71840)	840/DX (71841)
Resolution	1000dpi	1200dpi	1200dpi
RAM Standard/Max	32MB/128MB	64MB/128 MB	128MB/128MB
Built-in Hard Disk	Optional	Optional	2GB
RISC Processor	133MHz	133MHz	133MHz
Speed High Res/Photo	-	2ppm	2ppm
Pipeline Printing	Optional	Standard	Standard
Job Accounting	50 Jobs	500 Jobs	5,000 Jobs
Duplex Built-in Auto	Optional	Standard	Standard
Paper Tray 200-sh	Standard	Standard	Standard
Tray 500-sh each (2)	Optional	Optional	Standard (one)
Price	**$5,890**	**$7,285**	**$9,780**

Visit the Web Direct Link for the latest pricing, availability and information on Tektronix products. And why not register on-line for even better pricing?

Also available: Tektronix **A3** colour lasers! Great value from only **$11,495** (23071)

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Rent: Short or long term. Finance options available: IBM Easylease, AGC.

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HP Laser Printers

HP offers an upgrade warranty from the standard 1 year warranty to 3 year warranty on the LaserJet 2100 Series, LaserJet 4050 Series and LaserJet 8100 Series, when you purchase one of these printers between 01/09/1999 and 31/10/1999. Call for details.

⇨ FREE WARRANTY UPGRADE ⇨

HP Professional Colour InkJet Printers

HP 2000 Series

Business performance with breakthrough colour print speed. Black: 600dpi, 10 ppm. Colour: PhotoREt II, 4ppm. Low printing costs. 4 individually replaceable ink cartidges. Outstanding print quality. 5,000 pages monthly duty cycle. 2MB RAM.

2000C (69484) PRICE DROP! Was $1,345, now only **$930**

2000CN (69485) Network ready, additional 250 sheet paper tray **$1,649**

HP 2500 Series

Fast, brilliant colour printing for the work-group. **A3 capable.** Black: 600dpi, 9ppm. Colour: 3.5ppm. Rugged and robust. Low cost per page. 4 individually replaceable ink cartidges. Versatile media handling. 12,000 pages monthly duty cycle.

2500C (70725) Adobe PostScript 3 optional, 4MB RAM **$2,097**

2500CM (76060) Network ready, Adobe PostScript 3 standard, 20MB RAM **$3,030**

HP Colour LaserJet 4500 Series
16ppm mono
4ppm colour
600dpi
32MB RAM
From (70356)
$5,340

HP LaserJet 1100 Printer

HP's JetPath technology allows you the flexibility to expand the LJ 1100 into an all-in-one performer when your business needs grow. Crisp, sharp 600dpi laser printing. 8ppm. 2MB RAM. (70095) **$789**

HP LaserJet 1100A Printer-Copier-Scanner

If your current business needs require the LaserJet 1100 with copying & scanning capabilities, move up to the LaserJet 1100A. Printing, copying and scanning: all-in-one. Make laser copies at the touch of a button, even without the PC turned on. Scan resolution 600dpi enhanced, 300dpi optical. (70096) **$925**

HP LaserJet 2100 Series

All models feature: 1200dpi • 10ppm • 60MHz processor • 350-sheet capacity • 15,000 page monthly duty cycle • Excellent performance

LaserJet 2100
A fast flexible laser with room to grow.
(EIO, PCL 6, 4MB RAM)
(72291) **$1,345**

LaserJet 2100M
A fast flexible laser with PS and PCL.
(EIO, PCL 6, 8MB RAM)
(72292) **$1,620**

LaserJet 2100TN
A complete network printer.
(EIO, PCL 6, 8MB RAM, additional 250-sheet feeder, HP JetDirect print server installed)
(72293) **$1,910**

HP LaserJet 5000
16ppm
100MHz
1200dpi
4MB
Prints up to A3
From (60548)
$2,749

HP LaserJet 8000
24ppm
133MHz
1200dpi
16MB
Print/duplex up to A3
From (60551)
$4,578

HP LaserJet 4050

- ✓ Enhanced productivity features available with optional 2GB hard drive: Private Printing, Quick Copy, Proof & hold function, Infra Red Port, E-form solutions.
- ✓ Fast 133 Mhz processor
- ✓ 1200 dpi at full engine speed (16ppm)
- ✓ 10/100 base TX JetDirect card on N & TN models

2GB Hard Drive: (71915) **$962**

Model:	4050	4050N	4050TN
Input capacity:	1x100,1x500	1x100,1x500	1x100,2x250
RAM:	8MB	16MB	16MB
Network:	capable	ready	ready
Part number:	(77443)	(77445)	(77446)
Price:	**$2,299**	**$2,870**	**$3,430**

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Black toner for OptraColor 1200
$199
(65707)

M, C or Y toner for OptraColor 1200
$269
(65708, 75295 or 65709)

Photo-conductor
$195
(65710)

Transparencies, A4, 50 sheets
$99
(65712)

2nd Paper Drawer Assembly for OptraColor 1200
$668
(65702)

Call Harris Technology on 1300 13 9999 for more options or have a look at the Web Direct Link.

LEXMARK. OptraColor 45

A4 Colour
A3 Colour

Supports over-sized A3!

(65704)
$1,359

Enjoy professional colour in a big way

The OptraColor 45 is the wide format printer that offers workgroups the ultimate combination of speed, image quality, versatility and affordability. From over-sized A3 prints and CAD/CAM applications to colour spreadsheets and more, it's the printer that won't ask you to compromise.

LEXMARK. Optra SC 1275

A4 Colour

Give your business image a boost with affordable, high quality colour

With 16MB RAM (44304)
$4,379

With 32MB (44306) **$5,299**

The Optra SC 1275 not only provides affordable, 600dpi with 1200IQ colour output for all your business needs, it also races through letters, spreadsheets, presentations and other documents providing laser sharp black output. With it's quick 12ppm black/3ppm colour engine and high performance Intel 32-bit RISC processor, you'll benefit at every level of your business.

LEXMARK. OptraColor 1200

A4 Colour
A3 Colour

The new standard in colour printing

(65469)
$9,325

The Lexmark OptraColor 1200 is a dream come true for desktop colour users. A true CMYK in-line LED printer with a massive 200MHz RISC processor and up to 128MB RAM, it makes fast work of your most demanding needs. It speeds away at 12ppm colour and mono A4 and 6ppm colour and mono A3. From multiple originals of an A4 report to A3 proofs, the OptraColor 1200 is as good as it gets.

LEXMARK. Optra E310

A4 Mono

The faster, smaller, smarter personal printer

(77799)
$839

The newest member of the Lexmark family, the Optra E310 is perfect for small groups or individual use. The Optra E310 prints at 600x600dpi and 1200IQ at 8ppm. With its 67MHz RISC processor the Optra E310 has a fast time to first page and comes standard with a built-in USB port.

LEXMARK. Optra K 1220

A4 Mono

The multi-purpose desktop printer for cost-conscious businesses

(64495)
$1,139

The Optra K 1220 is designed to optimise your efficiency with up to 66MB RAM and 12ppm. This highly versatile printer features a standard 200 sheet input tray (expandable to 740 sheets). Add optional networking facilities, and you have the setup to optimise your workgroup printing.

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Canon

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You can on a Canon, can do!

Canon BJC-2000SP

- ★ **Compact new desktop design for printing ease** - open the front cover, printer switches into cartridge replacement mode, drop in loading system makes changing cartridges a snap.
- ★ **High-Quality photos and text with super economy** - Exclusive Drop Modulation Technology uses a combination of smaller and larger dots for smooth tonal gradation. With 720x360dpi resolution the BJC-2000SP produces exceptional image quality in regular colour mode.
- ★ **Advanced image processing with Photo Optimiser mode** - By optimising the gradations between light and dark tones the colour image-processing system built into the BJC-2000SP assures more natural looking images
- ★ **Auto image enhancement for low resolution graphics** - The unique Image Optimizer feature smooths jagged edges, dramatically improving print quality, especially at larger print sizes.
- ★ **Instant conversion into a full-colour, sheetfed scanner** - Pop in the optional scanner cartridge and this printer becomes a 360dpi full-colour sheetfed scanner.
- ★ **A full range of media for every application** - Accepts plain paper, envelopes, postcards, banner-length paper, overhead transparency film, high-gloss film, and T-shirt transfers.

(80926) **$184**

Canon BJC-265SP

Super economy - super performance bubble jet printer.
Image optimiser setting reduces jagged edges and faded colours. Produce up to 2400 pages in black and 400 pages in colour. Print black text at up to 4ppm.
Super Economy mode, up to 400 pages in colour, 2400 in black. Up to 4ppm in black, banner printing up to 6 pages. Ships with BC05 colour cartridge. Optional black, PhotoRealism and fluorescent cartridges available.

(76009) **$135**

PRICE BREAKTHROUGH

Canon BJC-5000

Dual Ink Cartridge system. Install two similar cartridges for twice the speed, or two different cartridges for twice the performance. The possibilities are great.
High Resolution, 1440x720dpi printing and 7 colours.
Prints up to A3. Great for full bleed A4! Print speed: mono HQ 7.5ppm, colour HQ 2.85ppm.
PhotoRealism® Technology to reproduce all the subtle nuances of a picture, right down to the very light shades. Prints transparencies, high resolution paper, T-shirt transfers etc., even prints banners.

(20756) **$355**

Canon BJC-6000

Combines speed, quality and cost savings

High Quality: At 1440 dpi, printouts appear crisp, with razor sharp images and silky smooth tonal gradation. With Color Image Processing turned on, the gradation between dark and light sections is significantly improved.
Separate ink tanks means that you only have to change the colour you use up.
Six colour printing ensures photo quality.
High Speed: 8ppm mono, 5ppm colour.
Smart Ink Level Detection
2 to 4 pages-in-one printing
Accurate dot positioning

(79220) **$479**

More from Canon

CanoScan Scanners

FB620P
Parallel: (68734) **$259**
SCSI: (73885) **$399**

FB320P
Parallel: (68733) **$170**

LaserBeam Printers

LBP-660
(42806) **$524**

LBP-1760

(63563) **$1,735**

Digital Cameras

Powershot A50
(81089) **$1,299**

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HP Iron-on transfers
10 sheets A4
$29
(52818)

HP Glossy greeting card paper
10-pack
$18
(70192)

HP Premium paper
200 sheets A4
$39
(19172)

HP Premium glossy paper
50 sheets A4
$79
(24427)

HP Premium photo paper
15 sheets A4
$18
(54010)

For more HP Media see the Web Direct Link

HP DeskJet 610C

NEW!

Sharp blacks and rich colours on a budget

- Optional Photo Cartridge for photo-quality colour
- Easy to set up and use

See Web Direct for updated pricing

(80426) **$279** RRP

HP DeskJet 810C

Brilliant photo-quality results for a great price

- Easy setup and operation
- Quiet, compact, durable
- Banner printing

(77961) **$389**

HP DeskJet 830C

NEW!

Smudge resistant, fast drying inks

- Prints on many media types & sizes: stickers, labels, photo paper, iron-ons, banners etc. • Automatic colour matching

(xxxxx) **$Call**

HP DeskJet 880C

Super-fast, stunning print quality on plain paper

- Photo-quality colour
- Black, laser-like text
- Poster, hand-out printing

(72920) **$479**

HP DeskJet 895Cxi

Networkable with optional JetDirect Print Server

- Fast and professional quality printer designed to grow with your business

(70705) **$788**

HP DeskJet 970Cxi

NEW!

2400dpi on photo paper!

- PhotoREt III for more shades of colour • Automatic two-sided printing • Print cancel button • Low ink warning

(xxxxx) **$Call**

HP DeskJet 1120C

Networkable all-rounder, prints A3 format

A3

- Reduce/enlarge your work at the touch of a button
- Billboard printing (up to 1.2m high), booklet, hand-out, mirror, banner printing

(56298) **$786**

What is Colour Layering?

PhotoREt 3 Colour layering technology is HP's latest advancement in inkjet printing that delivers the optimum combination of exceptional print quality and speed, using new vibrant, fade-resistant inks, smaller drop size and precise algorithms to place up to 29 drops per dot for finer colour control. Benefits: ·Incredibly realistic photo images ·Excellent results on everything you print · Clear, sharp, vivid, fade-resistant colour ·More shades of colour for realistic, natural looking photos ·Fast colour printing.

HP DeskJets	610C	810C	830C	880C	895Cxi	970Cxi	1120C
Speed Black	5ppm	6.5ppm	8ppm	8ppm	10ppm	12ppm	6.5ppm
Speed Colour	2.5ppm	4.5ppm	5ppm	5ppm	6ppm	10ppm	4.5ppm
Resolution Black	600dpi	600dpi	600dpi	600dpi	600dpi	600dpi	600dpi
Resolution Colour	600x300dpi	PhotoREt II	PhotoREt II	PhotoREt II	PhotoREt II	PhotoREt III	PhotoREt II
Monthly Volume	1000	1000 pages	1000 pages	2000 pages	3000 pages	5000 pages	3000 pages
Intput Capacity	100 sheets	100 sheets	100 sheets	100 sheets	100 sheets	150 sheets	150 sheets
Envelope Input	20	15	15	15	15	15	15
Network Capable	no	no	no	no	yes	yes	yes
Connectivity	Parallel	Parallel & USB	Parallel & USB	Parallel & USB	Parallel & USB	Parallel & USB	Parallel

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The HP "All-in-One" Series

HP OfficeJet 635

- Colour printer
- Colour copier
- Colour scanner
- Mono fax

(55544) **$667**

HP OfficeJet 725

- Colour printer
- Colour copier
- Colour scanner
- Colour fax

(80568) **$859**

See side bar for special offer!!!

HP LaserJet 3100

- Mono printer
- Mono copier
- Mono scanner
- Mono fax

(58566) **$1,399**

HP OfficeJet R45

- Colour printer
- Colour copier
- Colour scanner

(80302) **$1,449**

Improved image quality on all media types
Faster
Quieter
Smaller design
Banner printing

HP OfficeJet R65

- Colour printer
- Colour copier
- Colour scanner

(80322) **$1,640**

Improved image quality on all media types - Faster - Quieter - Smaller design - Banner printing

HP OfficeJet T45

- Colour printer
- Colour copier
- Colour scanner
- Colour fax

RRP: **$999**
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Distinctive ring detect: works with telephone anwering machine

NEW!

HP All-in-Ones	OJ 635	OJ 725	OJ T45	LJ 3100	OJ R45	OJ R65
Print Speed Black	5ppm	5ppm	9ppm	6ppm	11ppm	11ppm
Print Speed Colour	2ppm	2ppm	6.5ppm	-	8.5ppm	8.5ppm
Print Resolution Black	600dpi	600dpi	600dpi	600dpi	600dpi	600dpi
Print Resolution Colour	600x300dpi	600x300dpi	PhotoREt II	-	PhotoREt II	PhotoREt II
Fax/PC Fax Memory	65 pages	65 pages	55 pages	150 pages	-	-
Fax Speed Dials	100	100	75	175	-	-
Maximum Copies	99	99	99	99	50	99
Copier Zoom	50-200%	25-400%	50-200%	50-200%	25-400%	24-400%
Scan Resolution Enh.	1200dpi	1200dpi	300dpi	600dpi	9600dpi	9600dpi
Scan Resolution Opt.	300dpi	300dpi	1200dpi	300dpi	600x2400dpi	600x2400dpi
Scan Bit Depth	24-bit	24-bit	24-bit	256 levels grey	30-bit	30-bit
Paper Capacity	100 sheets	150 sheets	100 sheets	100 sheets	100 sheets	100 sheets
Auto Document Feeder	Yes	Yes	Yes	Yes	No	Yes

HP Colour Copier 170: as affordable as an ordinary black & white copier!

RRP: **$999**
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- Fast, convenient photo-quality colour and outstanding black & white copies.
- Special features: Super-Zoom (24-400%), Clone, Poster, Auto-fit, Reverse (for iron-ons), 2-on-1 (two originals onto one page).
- 600x600dpi optical black and PhotoREt II colour copying
- Up to 99 continuous copies, up to 11cpm mono, 8.5cpm colour
- Handles plain paper, HP Premium photo paper, HP Iron-on T-shirt transfers.

NEW!

BUY the new HP OfficeJet 725 and receive TWO Photo Cartridges valued at $150 FREE!!

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Transparency Adapter for SnapScan 1236s. Max. scanning area 203x254mm. (76779) **$399**

Automatic Document Feeder for DuoScan T1200. (75581) **$458**

Softcase for ePhoto 1280. (75606) **$33**

Cable set for ePhoto 1280/780/1680. (75603) **$46**

8MB Memory option for ePhoto 1280. (54719) **$188**

ePhotoAC Adapter & case (75337) **$118**

Have a look at the Harris Technology Web Site www.ht.com.au, not only for Agfa products, but also for the latest pricing and information on 34,000+ other computer products!

ePhoto CL30

NEW PRODUCT

The AGFA ePhoto CL30 is a high-performing, compact and simple to use, mega-pixel digital camera that expands the range of camera choices by offering high-end features, including a USB (Universal Serial Bus) interface and a resolution of 1440x1080 pixels. 4MB CompactFlash included. The stylish CL30 features a 1.8" colour LCD screen—perfect for framing shots or playing them back, and Auto focus lens with 2x digital zoom and macro. There are 4 flash modes.

(81626) **$819**

ePhoto CL50

Digital camera with built-in microphone for adding up to 10 seconds of voice or sound per image. Resolution 1600x1200 pixels. 3x optical, 2x digital zoom. Optical viewfinder and 2" LCD screen. Burst mode: hold shutter for continuous shots. Up to 96 photos on the included 8MB card.

(76793) **$1,635**

ePhoto 1680

Digital camera with swivel zoom lens for those hard-to-get photos. Resolution up to 1600x1200 pixels for photo-quality prints. 3x optical zoom, 2x digital zoom. 2" LCD screen. 5 and 10 second self-timer. Up to 48 photos on the included card. 4 flash settings. Ability to save camera settings.

(72300) **$1,658**

SnapScan 1212p

One pass, high quality 600x1200ppi scanner with parallel interface. 36-bit colour. Includes Caere Omnipage LE OCR, Caere PageKeeper, Corel PrintHouse Magic Select and Agfa's incredible ScanWise software. Compatible with Win95/98/NT.

(74495) **$249**

SnapScan 1212u

One pass, high quality 600x1200ppi scanner (9600ppi max) with USB interface. Includes Caere Omnipage LE OCR, Caere PageKeeper, Corel PrintHouse Magic Select & Agfa's incredible ScanWise software. Compatible with Win98 & USB Technology.

Available in white, translucent blue, green

White: (74496) **$258**

SnapScan 1236s

One pass, high quality 600x1200ppi scanner (9600ppi max.) with SCSI-2 interface. 36 bit colour. Includes Omnipage LE OCR, PaperPort, iPhoto Express, Color-It, and FotoLook software. Compatible with Win3.x/Win95/98/NT.

(74497) **$385**

DuoScan T1200

TwinPlate™ flatbed scanner with built in transparency scanning SCSI-2 interface. Optical resolution 600x1200ppi, 36 bit. Includes Omnipage LE OCR, PaperPort, Agfa's Fotolook, ColorTune, Caere OCR Software and Corel PhotoPaint 8. Document feeder also available.

(74498) **$1,315**

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New smart scanners for sharp results

HP ScanJet 3300C NEW!

- Scan or copy at the touch of a button
- USB port - just plug it in!
- Save, print, or send your scan to your selected application
- Software included: OCR, copying, Adobe PhotoDeluxe Home Edition, electronic information and troubleshooting guide

Easy to use - great results!

- Photo scanning
- Text recognition
- Copying

(81725) **$265**

HP ScanJet 6300C

Completes tasks up to four times faster

- Five buttons: Scan, copy, e-mail, fax and file
- Share your scanner on your Windows-compatible network
- Professional quality at lightning speed: scan photos in as little as 9 seconds!
- Software: OCR, LAN, copying, suite of Electronic HelpTools, Caere PageKeeper Standard 3.0, Adobe PhotoDeluxe Business Edition 1.1, Adobe PageMill 3.0

(81726) **$1,028**

HP ScanJet 6350C NEW!

Increase your productivity

As 6300C, but with additional:
- Automatic Document Feeder for unattended copying

These scanners feature HP Intelligent Scanning Technology

(81727) **$1,229**

HP ScanJet 6390C NEW!

More benefits than you can count

As 6300C, but with additional:
- Automatic Document Feeder
- Dual I/O: USB and SCSI
- Active Transparency Adapter
- SCSI kit with software and cables
- Adobe Photoshop (Full version)
- ReadIris Pro OCR software

(xxxxx) **$Call**

New HP ScanJet Family	3300C	6300C	6350C	6390C
Resolution Optical	600dpi	1200dpi	1200dpi	1200dpi
Resolution Enhanced	9600dpi	999,999dpi	999,999dpi	999,999dpi
Bit Depth	36bit	36bit	36bit	36bit
Interface Standard	USB	USB	USB	USB, SCSI
Interface Optional	-	SCSI	SCSI	-
For Operating System	Win98	Win95, 98, NT 4.0	Win95, 98, NT 4.0	Win95, 98, NT 4.0
35mm Slide Adapter	Yes	Yes	Yes	No
Active Transparency Adapter	No	No	No	Yes
Auto Document Feeder	No	No	Yes	Yes

More HP ScanJets

3200C
30 bit. Parallel. 600dpi opt/ 9600dpi enh. (74116)
$185

4100C
USB. 36 bit. 600dpi HSS/ 1200dpi enh. (67196)
$249

4200C
USB. 36 bit. 600dpi/9600dpi enh. (74117)
$299

5200C
USB & Parallel. 36 bit. 600dpi/ 9600dpi enh. (74118)
$459

6250C
USB. SCSI capable. 36 bit.600dpi/ 999.999dpi enh. ADF. (66185)
$940

Call for bundles HP Scanner+ Photoshop or OmniPage

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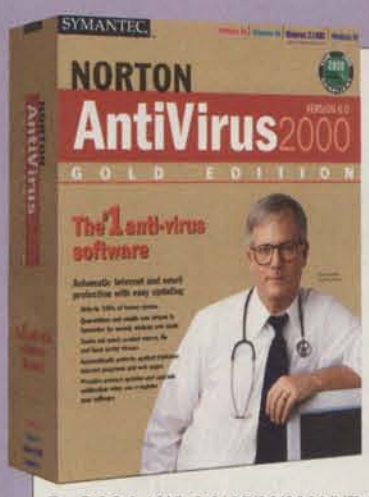

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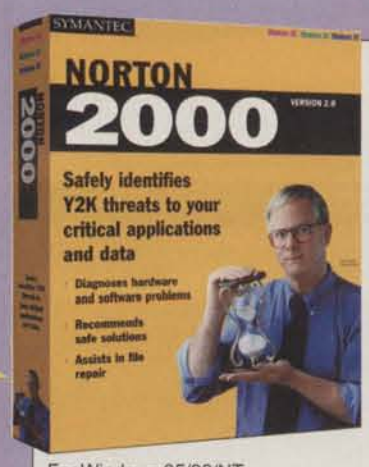

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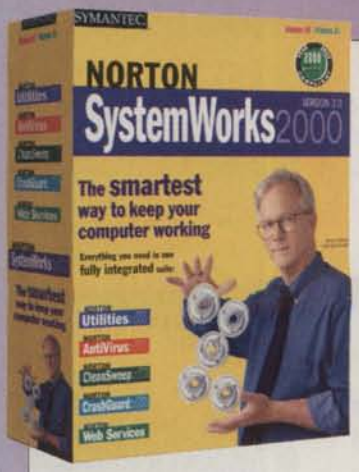

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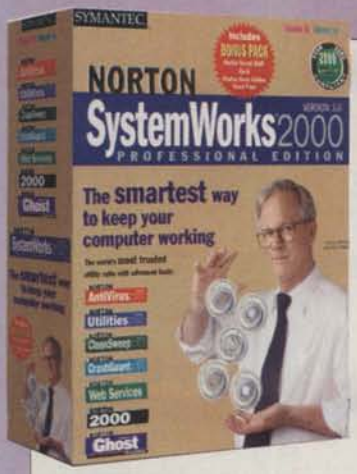

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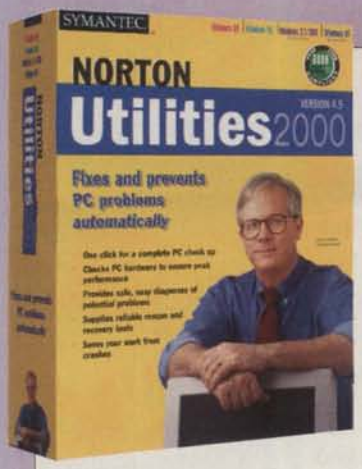

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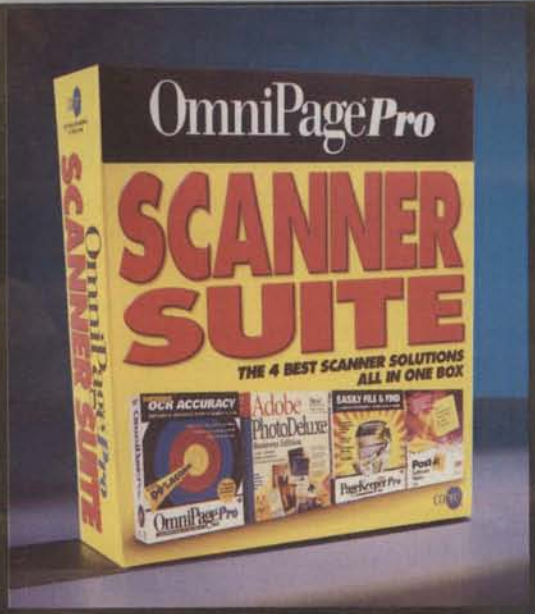

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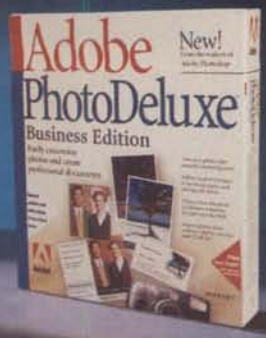

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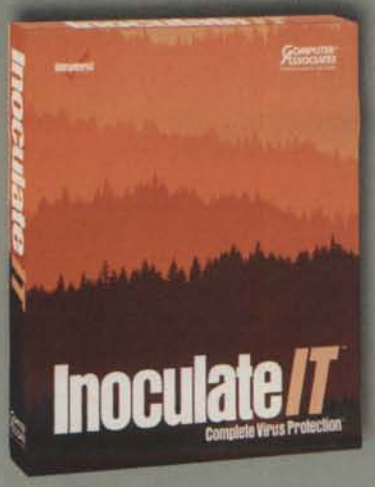

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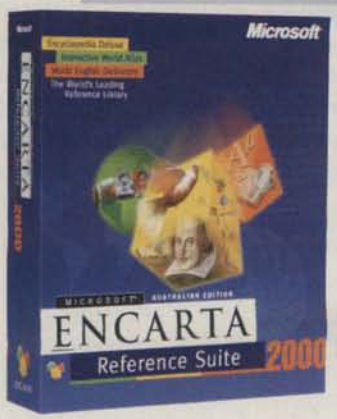

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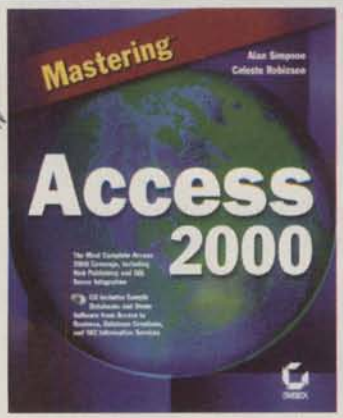

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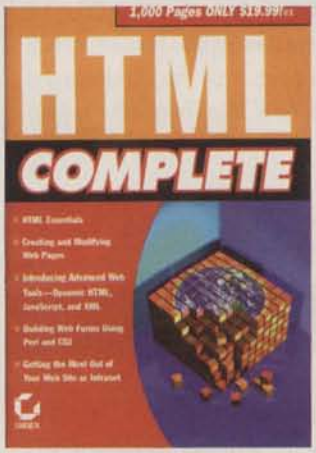

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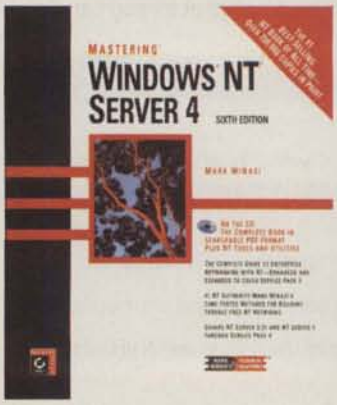

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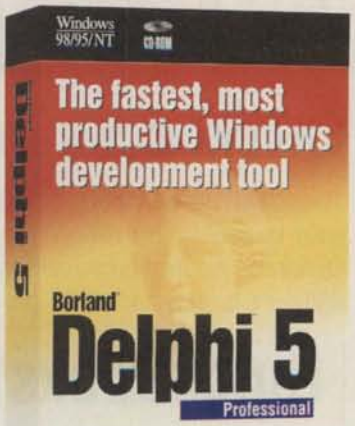

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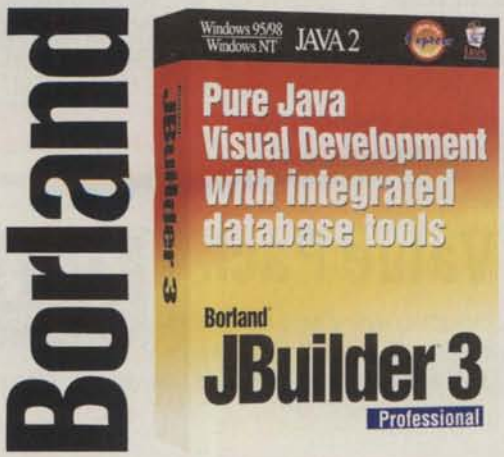

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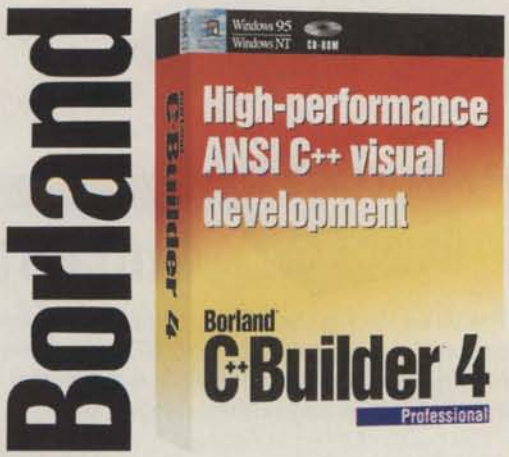

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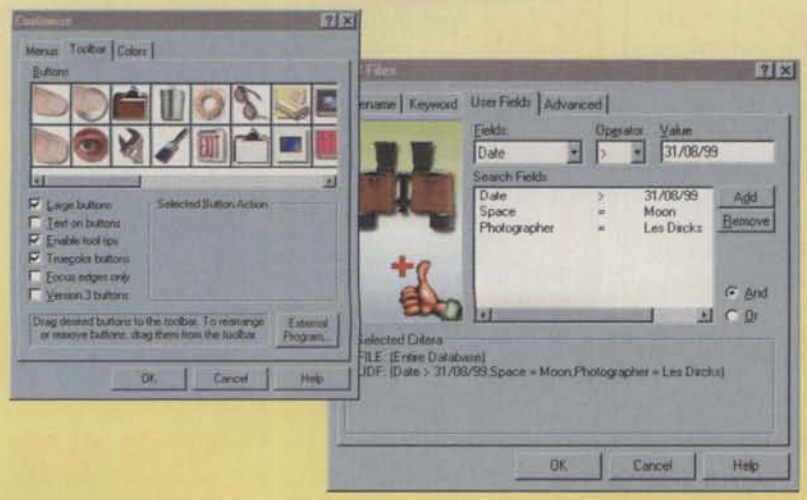

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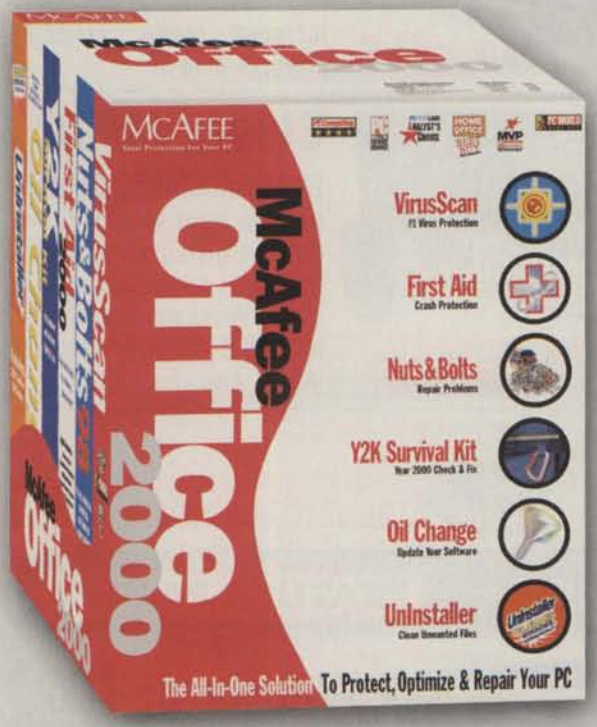

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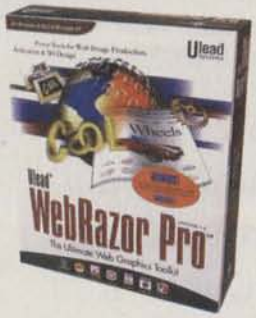

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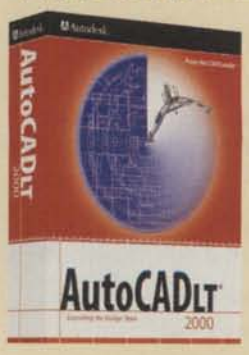

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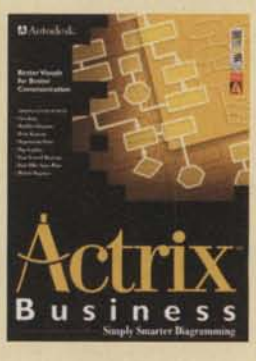

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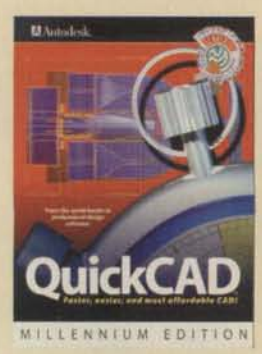

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Hello everyone and welcome to our October catalogue. Before I start, you must remember to check out the fantastic new Symantec 2000 range. Designed to end PC Rage (and haven't we all been a victim of that!), they offer amazing functionality at fantastic new low prices. Another stormer from Symantec!

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Talk to our friendly sales team and explain your requirements. If you need more information, just let them know. Your sales team contact will take your name, delivery address and credit card details.

Your details are transmitted over a secure link, and monitored by our Internet team. If you are at all worried about the security of this function, you can check out the exact details on the site before you order. If you are still not sure, simply fill in the order form, print it off and fax it through (or fax straight from your PC if you have Winfax Pro). Simple!

For goods that are in stock (and over 80% of the 5000 plus products we offer are!), we will debit your credit card and send your purchase to you by overnight courier. If the goods are unavailable at the time of order, our purchasing team will then contact our best suppliers to obtain your products as fast as possible. Your credit card will not be debited until the goods are ready to ship.

Your purchase will arrive by Australian Air Express couriers on the date specified by your sales team contact. We are so confident of their service that if Australian Air Express have not attempted delivery by that time, we will refund your delivery charge.

WHAT YOU GET

- Low prices (up to 30% off RRP)
- Huge Range (5000 plus products available)
- Convenience (order from home or work)

WHAT YOU DON'T GET

- High Prices
- Trouble finding a parking space
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- Traffic jams on the way home!

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Order from International Software Warehouse.

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- Headset with Microphone
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- Internet Starter Kits with 50 to 100 hrs free Internet time
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ABC003
$99

WebSearch Code: ABC003

See page 17

Kodak CD-R Discs

$2.70 each

Princo CD-RW Discs

$9.50 each

See page 13

Bulk pricing (100 or more) available. Call our sales team for details

Home Movie Director

Now you can produce a Video Family Album quickly & easily using just your camcorder & VCR. Contains easy to follow handbooks & set up guides, script editor, video label printer plus a bonus instructional video & CD-ROM. This motion picture album is a must for all camcorder owners.

NIT020
$19

WebSearch Code: NIT020

McAfee Mega Office Bundle

Includes:

- Viruscan v4
- Nuts & Bolts 98
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- Guard Dog
- Oil Change
- Toolbox 2000
- PGP

$500 worth of Software for only $179

MCA157

WebSearch Code: MCA157

* boxes shown for illustration purposes only

Turn Ordinary Videos Into Extraordinary Videos with Studio 400

As Seen on Australia's Funniest Home Video Show

Whether you want to edit videos of the kids and want a simple plug and play editor for your home PC, or you're putting together a corporate presentation or editing video for your web site, there is a Pinnacle Studio editing product for you

PRICE DROP

~~$669~~

Studio 400
NIT013
ONLY
$499

Both the Studio 400 and Studio DC10 Plus feature:

- Pinnacle's award winning Studio editing software which offers users simple drag and drop editing, plus 100s of special effects.
- TypeDeko titling software for giving your productions professional looking titles.
- SmartSound Studio software for generating background music and for adding narration or a CD soundtrack to your movies.

RECOMMENDED PC REQUIREMENTS	
Processor	P133
Hard Drive	2GB
RAM	16MB
SCSI Drive	No
Operating System	Win95/98

WebSearch Code: NIT013

HP OfficeJet 725

Four in one system, Printer, Fax Copier and Scanner - All in Colour!

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Special Offer 2 Free Photo Cartridges in the box worth $150!

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Expanding Possibilities

HP OfficeJet 725
HWP382
$859

WebSearch Code: HWP382

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* where applicable

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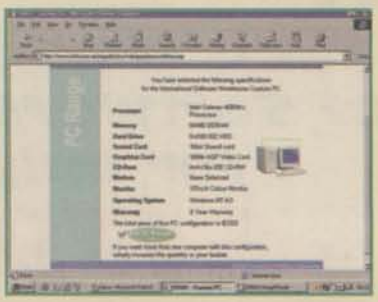
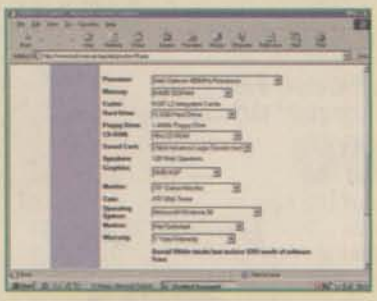


CELERON 400 $1299*

Calculate the Price



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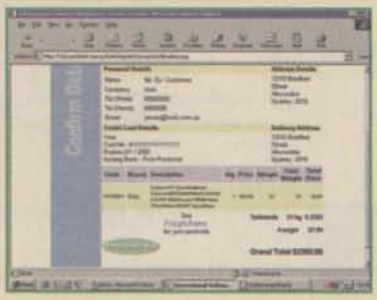

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56K modem
40xCD ROM
8Mb Graphics Card
Win 98

VPC005
$1299

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ATI All-in-Wonder

All-in-one TV, video and editing multimedia – everything you need in one great product. The All-in-Wonder even features real-time video compression for recording TV programs without using too much space.

NEW PRODUCT

- 128 bit, 3D, 2D and 2D PCI graphics card
- DVD through PC or home theatre
- TV Tuner
- Web TV
- Video Editing
- TV Out
- DVD Hard/Ware

ATI031
$399

WebSearch Code: ATI031

ATI Rage Fury

If you are looking for the ultimate 3D gaming board then look no further. This board is powered by ATI's Rage 128 graphics technology with a huge 32 Mb of memory. Its fully enabled AGP 2x graphics board will power all of your favourite graphic intensive gaming and entertainment applications for explosive 3D gaming action.

32 MB

- 32MB SDRAM
- 128-bit accelerator
- 250mhz ramdac
- TV-out
- Twin cache
- Built in DVD hardware
- Designed for gamers

*box shot for illustration purposes only

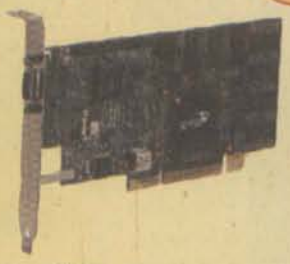
ATI030
$279

WebSearch Code: ATI030

ATI Xpert 128

Powerful 128-bit 3D, 2D and video acceleration makes this fully enabled AGP 2x graphics board the perfect graphics upgrade for the small office or home based PC user.

NEW PRODUCT



- 16MB on board RAM
- 128-bit accelerator
- Advanced 3D features
- Built in DVD hardware
- Twin cache

ATI032
$189

WebSearch Code: ATI032

UPGRADES

Sound Quality with Style

PLANTRONICS. World Leader in Communications Headsets

Plantronics, the world leader in communications head-sets, introduces an exciting new line of PC headsets. The Plantronics PC headset product line delivers the ultimate in technical performance, comfort, durability, and style. Plantronics' full line of PC headsets is designed for use with all PC applications from speech recognition and video conferencing to game playing and Internet communication

Perfect Solution

Plantronics PC headsets are used for a variety of PC applications in the office and home environment. A Plantronics PC headset adds clarity and accuracy to any speech recognition application. Internet telephones, PC games with voice command and control, video conferencing, and music CDs are just a few of many uses for Plantronics PC headsets. Plantronics headsets are designed for easy "plug and play" performance with today's leading soundcards. Each headset features two 3.5mm plugs for the microphone and headset (or "speaker out") jacks.

- Gaming/Multimedia Stereo Headset
- High-fidelity stereo speakers
- In-line controls for volume and microphone
- Lightweight, rugged design
- Comfortable circumaural earmuffs
- Elastomer-mounted boom for quick microphone adjustment

STEREO HEADSET FOR GAMING, SPEECH RECOGNITION & VIDEO CONFERENCING

NEW PRODUCT

Light Weight Stereo Headset (LS1)

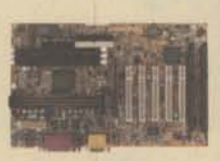
PLA049
$99

WebSearch Code: PLA049

The New Range of Motherboards from MSI

MS-6163PRO - Intel 440 BX

- Designed for Intel PII/PIII Slot1 Processor
- Free of jumper and DIP Switch
- No manual is needed for your CPU upgrade
- Multiple clock support up to 155MHz
- Adjustable CPU voltage
- Provides multi-sensors for detecting CPU, Systems, and HDD temperature
- Free PC health Moni. and Anti-Virus Software
- 5PCI/2ISA/1AGP, ATX
- Y2K/PC99 Compliant

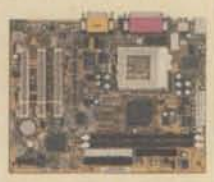


MSI001
$189

WebSearch Code: MSI001

MS-6178 - Intel 810

- Designed for Celeron S370 processor
- Free of Jumper and DIP Switch
- No manual is needed for your CPU Upgrades
- Doctor D-LED
- PTI (Panel Link TV Out) Interface
- ATA33/66 Ready
- Free PC Health Moni. and Anti-Virus Software
- 3PCI/2DIMM/1AMR/1PTI, MATX
- Y2K/PC99 Compliant

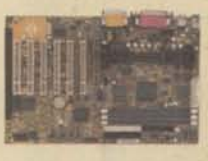


MSI002
$209

WebSearch Code: MSI002

MS- 6182

- Designed for PII/PIII Slot 1 processor
- Free of Jumper and DIP Switch
- High Performance 3D Graphics/Audio Integrated
- PTI (Panel Link TV Out) Interface
- ATA 33 / 66 Ready
- Free PC Health Mon. and Anti-Virus Software
- 6PCI/1ISA/3DIMM/1AMR/1PTI, ATX
- Y2K/PC99 Compliant



MSI003
$209

WebSearch Code: MSI003

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MITSUBISHI

50X 50X 50X 50X 50X !

50X CD-ROM

NEW PRODUCT

50 Speed CD-ROM Drive Hits the Market

This new product, in particular, is designed to optimise vibration and noise from high speed playing to ensure high performance and stability.

Features

- Interface — *UDMA E-IDE ATAPI*
- Data transfer rate — *Up to 7.5Mbytes/sec @ 50X max*
- Access time — *100ms*
- Buffer size — *128 Kbytes*
- Disc loading mechanism — *Motorised tray-load*
- Weight — *900 grams*
- Warranty — *12 months*
- Quiet operation
- Low disc vibration
- Multi-read compatible (CD-RW)
- CD Play button for software-free CD playback

WebSearch Code: MIT014

MIT014
$99

DVD Pro-Kit with Microsoft Encarta DVD 99!

FREE ENCARTA

The Pro-Kit DVD upgrade kit offers the complete multizone DVD playback solution for all Pentium PCI or faster PC's. Combining the best available DVD-ROM drive with the market leading DVD decoder card, the Pro-Kit DVD offers nothing but the best in hardware quality. Add to the kit Microsoft's Encarta 99 DVD Reference Suite and you have all you need to get started!

Features

- Super-fast 6X Pioneer slot-load DVD-ROM drive (32X CD-ROM)
- Play the latest DVD movies full screen on your PC at full frame rates in full colour, with hardware decoded Dolby AC3 audio!
- Multizone playback up to a maximum of 5 times
- Composite and S-video outputs built-in for display straight to a television
- Capable of reading all CD and DVD formats (not DVD-RAM)
- Bundled with Microsoft's Encarta 99 DVD Reference Suite: Includes MS Encarta Deluxe 99, Microsoft Virtual Globe 99 and Microsoft Bookshelf 99 all on 1 DVD-ROM!

WebSearch Code: PIO007

Internal
PIO007
$499

MPlayer3

NEW PRODUCT

MP3 is the new recording format taking the world by storm. Music is digitally stored, and the MP3 device reads the music data directly, without any mechanical motion taking place. The quality of reproduction is CD standard, and because there are no mechanical parts, the unit is extremely shock proof.

With the MPlayer3, music files are stored on exchangeable flash cards - MultiMediaCards. This enables you to increase available storage, and change the music simply by changing the card. You don't have to keep downloading each time you want to change the music. The cards are currently available in 16MB (approximately 20 min of music) and 32MB (approximately 40 min of music), and can be purchased separately. German made. Full version operating software (Win/Mac/Linux) included.

Ask us about the USB Card Station for 50 times faster data loading!

WebSearch Code: MPL001

MPlayer3 Win/Mac + 32MB
MPL001
$389

Pioneer 6X DVD & 32X CD-ROM Drive

Includes Cyberlink Power DVD Software Decoder

PowerDVD

NEW PRODUCT

Pioneer again lead the way with the release of their new 6X DVD-ROM drive series. Offering blistering 6X DVD and 32X CD-ROM read performance combined with Pioneer's ultra-stable tray-load technology, the DVD103/113 series are simply the best available. From Pioneer, the leader's in DVD.

Features

- High speed 6X DVD class, sustained data transfer rate of 8.1 Mbytes/sec!
- Reads Single and Dual Layer DVD-ROM, DVD-Video discs plus DVD-R, CD-ROM, CD-R and audio CDs
- Uses Pioneer's ultra-stable tray-loading disc technology
- Ultimate quality hardware from Pioneer, the leaders in DVD
- 2 Year Warranty
- Internal

WebSearch Code: PIO009

PIO009
$199

OFF008	AOpen 6x DVD-ROM	$399
AUP163	JAZ Traveller	$89
IOM073	ZIP Disk Labels 20-PK	$5
HWP252	HP CD-RW Single	$29
PRI006	Princo 80 Min CD-R	$5.95
IMA004	Imation SuperDisk 3-PK	$75
IMA005	Imation SuperDisk 5-PK	$119
IMA006	Imation SuperDisk 10-PK	$219
SONY19	Sony CD-R 650MB 74Min 10-PK	$309
KOD042	Kodak CD-R 74Min 8x KSP	$2.70
KOD043	Kodak CD-R 74Min 8x NSP	$2.70
VER043	Verbatim CD-R Media Single	$2.95
VER080	Verbatim CD-R Media 10-PK	$29
VER081	Verbatim CD-RW Media Single	$12.95
MIT013	Mitsubishi External CD-ROM Kit (Parallel)	$269
PIO008	Pioneer 40X SCSI CD-ROM	$229

CD-ReWriter Plus 8200i

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Expanding Possibilities

The fastest, easiest way to make your own CDs 24x 4x 4x

HPis top-of-the-line multimedia, multipurpose CD-RW (rewritable) drive gives you the power to be productive! Fast performance gives you fast results! Share Large Files with Anyone, Anywhere. HP's CD-Writer Plus 8200i series is the fast, easy, efficient way to do business:

FREE SOFTWARE BUNDLE VALUED AT $300

- The perfect tool to develop your own multi-media presentations, projects and more.
- CD Labeller comes complete with the kit that allows you to label your jewel case.
- Automatically back up and index your files to CD and find them even faster.
- Quickly and easily restore your hard drive files and operating system with HP Disaster Recovery.
- Write to CD-RW in less than 5 minutes with HP Fast Format - save hours of formatting time.
- Drag and drop - use like a floppy.

SureStore

HPP044
$625

WebSearch Code: HPP044

STORAGE & CD-WRITERS

Kodak IDE CD-ReWriter Kit

NEW PRODUCT

Features

- 4x Writable, 4x ReWritable, 24x Read
- Disc and track-at-once recording
- New WinOnCD 3.6
- Packet CD 3.0
- Gazo Personal Imaging Warehouse
- Video CD2.0 capable
- Full in-box solution
- Audio Features
  - *includes 5m long HiFi connection cable*
  - *record to hard drive from any audio source*
  - *de-click, EQ adjust, insert track breaks, etc*
  - *MP3 to CD Digital Audio*

KOD049
$449

WebSearch Code: KOD049

CD-ReWriter Plus 7510e

Easy Installation 6x 2x 2x

FREE SOFTWARE BUNDLE VALUED AT $500

- Easy installation, plugs straight into your parallel port, easily transferred between computers.
- Create your own music CD's that can be played in any CD audio player. ACID Music Creator.
- Automatically back-up and index your files - fast with HP Simple Trax 2.0.
- Adaptec Direct CD & Easy CD Creator makes it easy to write data, photo, audio and video files to a CD.
- HP Disaster Recovery quickly and easily restores your hard drive files and operating system in minutes.
- HP Fast Format writes or formats CD-RW's in less than 5 minutes.
- Incudes one free blank CD and CD-RW.

SureStore

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HPP045
$625

WebSearch Code: HPP045

Verbatim Smart and Friendly CD Racer 2224 Internal IDE

INCLUDES FREE SOFTWARE VALUED AT OVER $699

The Smart and Friendly CD-RACER CD-Recorder with CD-RW ReWritability Writes at 2x, ReWrites at 2x and Plays back at 24x with a plentiful 2MB buffer. The CD-Racer is a low-cost CD-Recorder solution that brings you new levels of performance and technology. The CD Racer includes a comprehensive software suite and includes all necessary accessories.

Software Suite includes:

- Adaptec Easy CD Creator Standard Edition
- MediaPath MediaAgent
- ECI Disc Inspector Pro
- Smart and Friendly CD Consultant
- Diamond Cut Enhance/CDR

VER078
$395

WebSearch Code: VER078

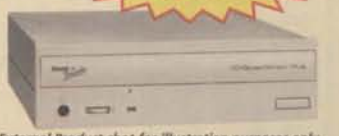
Verbatim Smart and Friendly CD SpeedWriter Plus 4224 Internal IDE

The Smart and Friendly CD SpeedWriter Plus is a 4x Write, 2x ReWrite, 24x Playback CD-Recorder with a plentiful 2MB buffer, capable of creating a full 650MB CD in as little as 17 minutes. It is ideal for music and audio storage, data archiving and backup, disaster recovery, digital imaging and a whole range of multimedia applications.

INCLUDES FREE SOFTWARE VALUED AT OVER $1400

Software suite includes:

- Adaptec Easy CD Creator Standard
- PowerQuest Drive Image
- Diamond Cut Enhance/CDR
- Sonic Foundry CD Architect
- Sonic Foundry Sound Forge XP
- MediaPath MediaAgent
- ECI Disc Inspector Pro, Smart
- Friendly CD Consultant



External Product shot for illustration purposes only

IDE (Internal)	SCSI (External)
VER079	VER082
$439	**$849**

WebSearch Code: VER079
WebSearch Code: VER082

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HP LaserJet 1100 & HP LaserJet 1100A

HP LaserJet 1100: It's the new, improved personal laser printer standard

COPIER & SCANNER ATTACHMENT FOR 1100A

- 8 pages per minute rated engine speed
- 2 MB RAM handles complex documents with ease
- Parallel cable in the box
- 125 sheets bin capacity
- Improved print quality produces better graphics and images
- Enhanced driver allows manual duplexing and N-up printing
- HP UltraPrecise Toner Cartridge for improved gray scale images
- Windows 3.1, 3.11, 95, 98, NT 4.0, OS/2 and DOS
- JetPath technology allows you to add copying and scanning capabilities

HP LaserJet 1100A: All the features of the 1100 plus Print - Copy - Scan

HWP257
HP LaserJet 1100
$789

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HWP258
HP LaserJet 1100A
$929

WebSearch Code: HWP257
WebSearch Code: HWP258

FS-680

KYOCERA Technology with a Conscience

All lasers are not created equally!

Kyocera has re-defined laser printer design to avoid the frequent replacement of the drum and the developer. When a Kyocera ECOSYS printer runs out of toner, that's all you replace. It not only costs less, it causes less harm the environment too.

The FS-680 offers the perfect printing solution for the home office, small business or personal printing requirement.

Print speed	8ppm
Resolution	600dpi enhanced to 2400dpi
Standard emulations	HP PCL 5e
Processor	50 MHz Power PC
Standard / maximum memory	4 / 36Mb
Standard paper input	150-sheet cassette
Maximum paper input	400 sheets, 2 sources
Consumer yield	3,000 A4 pages @ 5% coverage
Duty cycle	5,000 pages / month

WebSearch Code: KYO016

KYO016
$595

Canon BJC-80

Uses half your briefcase not half your desktop!

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- Office laser quality finish and B&W speeds up to 4.5 pages per minute with dedicated black cartridge.
- Better Internet images with Image Optimiser.
- Windows 95 compatible IrDA infrared port for cable-less communications.
- Optional scanner head for colour graphics, OCR and faxing.
- Fits in half a briefcase, weighs only 1.4kg!
- International warranty included with purchase.

WebSearch Code: CAN001

CAN001
$335

Canon BJC-7100

Advanced, sophisticated colour system

- 7-colour ink system and up to 25 levels of tonal gradation for incredibly rich photographic half-tones.
- 90 times more colour combinations than conventional CMY inks.
- High and low density inks define difficult to reproduce skin tones.
- PhotoRealism printing on plain paper.
- Superior plain paper performance.
- P-POP (Plain Paper Optimised Printing) gives plain paper a coated paper quality finish for better looking output.
- Documents printed with P-POP are 99.4% water fast!

WebSearch Code: CAN100

CAN100
$499

HWP355	HP DeskJet 880C	$559
HWP365	HP DeskJet 695C	$255
HPP019	HP DeskJet 1120C	$889
HWP346	HP DeskJet 710C	$325
HWP164	HP DeskJet 420C	$169
HPP109	HP Pro 2500C InkJet	$2049
HWP362	HP OfficeJet Pro 1175C	$1765
KYO012	Kyocera FS-800	$1039
HWP209	HP OfficeJet 635	$771
HWP382	HP OfficeJet 725	$879
HWP214	HP 2000C Pro Series Printer	$1349
CAN218	Canon BJC4650 (A3)	$409
CAN101	Canon BJC5000	$519
CAN099	Canon IS22 Colour Scanhead	$149
LEX111	Lexmark Optra E310 Laser	$879
KYO017	Kyocera FS-1700 Laser	$1639

BJC-2000SP

Canon

Super Economy, Super Performance

Compact new desktop design for printing ease

- space-saving footprint fits your desktop
- IEEE 1284 P/Port
- open the front cover and the printer automatically switches into cartridge replacement mode
- drop-in loading system makes changing cartridges a snap

High-quality photos and text with super economy

- optional Photo Cartridge delivers stunning photographic reproduction even on plain paper
- Photo and Regular Colour Cartridges incorporate Canon's exclusive Drop Modulation Technology, which uses a combination of smaller and larger dots for smooth tonal graduation
- 720 x 360 dpi resolution produces exceptional image quality in regular colour mode
- prints up to 3600 pages of black text using the BC-20 cartridge
- prints up to 900 pages in black text and 400 pages in colour using the BC-21e colour cartridge

Advanced image processing with Photo Optimiser mode

- produces more natural-looking images by optimising the graduations between light and dark tones
- automatically corrects image colour, exposure and saturation for the printer, without affecting the original image file

Auto image enhancement for low-resolution graphics

- Image Optimiser feature smooths jagged edges, dramatically improving print quality, especially at larger print sizes

Instant conversion into a full-colour, sheetfed scanner

- becomes a 360dpi full-colour sheetfed scanner by simply popping in the optional Scanner Cartridge IS-22

A full range of media for every application

- Accepts envelopes, postcards, banner-length paper, overhead transparency film, high-gloss film, and T-shirt transfers in addition to plain paper

WebSearch Code: CAN252

WebSearch Code: CAN099

Optional Scanner Attachment CAN099 **$139**

CAN252 **$189**

PRINTERS

HP Deskjet 610C

Inexpensive and easy to use, the HP DeskJet 610C printer produces affordable, high-quality colour and black printing for all your home and school needs.

The affordable printer for easy, quality colour results.

- Crisp black text, vibrant colour
- dark blacks and rich colours deliver sharp - looking results - even on plain paper
- HP PhotoREt technology for photo-quality colour images (with optional HP Photo Cartridge)
- ColorSmart II technology provides perfect colour automatically
- Parellel Port IEEE 1284

WebSearch Code: HWP405

HWP405 **$249**

HP DeskJet 810C

HP's brilliant photo-quality colour printer at the right price

The HP DeskJet 810C makes everything you print look great, even on plain paper. With HP's RealLife Imaging System, brilliant photo-quality colour printing is easy. Built-in ColorSmart II gives you perfect colour automatically, so what you see on screen is what you get.

- up to 6.5 pages per minute black, 3 pages per minute colour
- resolution 600 dpi black, HP PhotoREt II colour
- easy setup and operation provide hassle-free printing
- compact design and quiet operation ideal for small workspaces
- compatible with Windows NT 4.0, 98, 95, 3.1x and MS DOS applications
- Parallel and USB connectivity

WebSearch Code: HWP378

HEWLETT PACKARD
Expanding Possibilities

HWP378 **$389**

EPSON Stylus Color 740

An outstanding combination of print quality and performance

Key Features

The EPSON STYLUS COLOR 740 incorporates the latest state-of-the-art technology to ensure it is right at home meeting the demands of the power colour user.

- ultimate performance for the SOHO user
- Mac, PC and USB compatible
- 1440 x 720 dpi (even on plain paper)
- EPSON's variable droplet size technology
- 12 month Warranty to option to upgrade to 3yr Warranty

WebSearch Code: EPS330

EPS330 **$489**

EPSON Stylus Photo 1200

The ultimate A3+ photo reproduction quality inkjet printer for graphic artists & professional photographers

The STYLUS PHOTO 1200 works as an artist would, using large ink dots for solid colours and smaller-sized dots for blends and gradations. This makes colour accuracy and shade clarity high. In addition, print speeds are not compromised even with the superior print quality.

The EPSON Stylus Photo 1200:

- delivers 1440dpi, full-bleed A3 prints with ink droplets invisible to the naked eye
- handles paper sizes from 4 x 6" to A3+ (329 x 483mm)
- supports Windows 95, 98, NT 4.0, Mac and iMac systems
- includes parallel, Mac, serial and USB interfaces

WebSearch Code: EPS344

EPS344 **$929**

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UMAX® Astra 2000U

The Smarter Colour Scanner That Makes Scanning Simple

NEW PRODUCT

The UMAX Astra 2000U provides an ideal scanning solution for all of your photos and documents. It's never been easier to add texts to brochures, flyers, web pages and presentations.

The Astra 2000U provides support for both Windows 98 and Macintosh (including iMac) systems, that support the USB interface.

Set up of the scanner simply involves plugging in and installing the software

- Optical Resolution - 1200 x 600dpi
- Maximum Resolution - 9600 x 9600 dpi
- Colour Scan Method - Single Pass Colour CCD
- Maximum Scan Area - 216 x 297 mm
- Colour Mode - 36 bit
- Hardware Interface - USB
- Bundled Software - VistaScan with MagicMatch
  - Presto! PageManager BE
  - Adobe PhotoDeluxe
  - UMAX Copy Utility
  - Caere Omnipage L.E.
  - Recognita Standard OCR

WebSearch Code: UMA024

UMA024 **$259**

UMAX® Astra 2100U

The Smarter Single Touch Scanning Solution

NEW PRODUCT

The UMAX Astra 2100U provides an ideal scanning solution for all of your photos and documents. It's never been easier to add text to brochures, flyers, web pages and presentations. One Click: Scan, Copy and E-mail or OCR for fast results.

The Astra 2100U offers an easy connection with a Universal Serial Bus Interface, the latest advance in scanner and peripheral technology! Built with a 36-bit colour CCD plus BET, the Astra 2100U captures an amazing 68.7 billion colours to bring all your images to life.

With a USB interface, setting up a scanner has never been easier, simply plug in and install the software

- Optical Resolution - 1200 x 600dpi
- Maximum Resolution - 9600 x 9600 dpi
- Colour Scan Method - Single Pass Colour CCD
- Maximum Scan Area - 216 x 297 mm
- Colour Mode - 36 bit
- Hardware Interface - USB
- Bundled Software - VistaScan with MagicMatch
  - Presto! PageManager BE
  - Adobe PhotoDeluxe
  - UMAX Copy Utility
  - Caere Omnipage L.E.
  - Recognita Standard OCR

WebSearch Code: UMA025

UMA025 **$339**

Canon FB320P

Canons new LIDE technology eliminates the need for costly, complex optical mirrors for capturing the image. This gives you a smaller, sleeker scanner whilst still retaining superior image quality and colour clarity.

The Canoscan FB320 comes with a full software suite, and everything you need to start scanning immediately. The combination of beginner and expert controls means you don't need a degree in electronics to produce fantastic results. It also comes with a one year warranty and unlimited hot line support.

Features:

- 300 dpi optical resolution (2400 dpi via software enhancement)
- A4 colour scan at 300 dpi - 60 seconds
- 30 bit colour acquisition
- Photo Express and Omnipage LE software
- Full tutorial and Users manual
- Parallel cable included (parallel version only)

WebSearch Code: CAN255

CAN255 **$175**

UMAX® Astra 2400 s+

The Complete Corporate Graphics Scanning Solution

NEW PRODUCT

The UMAX Astra 2400s+ with UTA-2400 is the fastest scanner in its class! 2400x600 dpi hardware resolution, with superior CCD resolution or highest quality images, 9600 x 9600 dpi maximum resolution.

The Astra 2400s+ built with a 36-bit colour CCD plus BET, (Bit Enhancement Technology) provides the equivalent of a 42 bit image with bright and vibrant colours.

A dynamic range of 2.9 provides greater detail in the highlights and shadows area.

- Optical Resolution - 2400 x 600dpi
- Maximum Resolution - 9600 x 9600 dpi
- Colour Scan Method - Single Pass Colour CCD
- Maximum Scan Area - 216 x 356 mm
- Colour Mode - 36 bit plus BET
- Hardware Interface - SCSI II
- Bundled Software - VistaScan with MagicMatch
  - Presto! PageManager BE
  - Adobe PhotoDeluxe
  - UMAX Copy Utility
  - Caere Omnipage L.E.
  - Recognita Standard OCR

PC UMA026 **$1249**

Mac UMA027 **$1249**

WebSearch Code: UMA026
WebSearch Code: UMA027

UMA014	UMAX Astra 1220P (Parallel)	$199
UMA015	UMAX Astra 1220S (SCSI)	$419
UMA021	UMAX Transparency Adaptor	$299
CAN093	Canon CanoScan FB620P	$299
HPS020	HP ScanJet 6200C	$745
HPS021	HP ScanJet 6250C	$939
HPS025	HP Scanjet 6250C w/OmniPage	$1159
HPS032	HP Scanjet 6200C w/Photoshop 5 OEM	$1325
HWP399	HP PhotoSmart S20 Scanner	$999
PRO526	Microtek ScanMaker X6 Parallel	$399
PRO524	Microtek X6 Transparency Adaptor	$229
PRO517	Microtek ScanMaker 9600XL	$3369
OMN117	OmniPage Pro Scanner Suite Upgrade	$279
OMN020	OmniPage Pro 9.0 Upgrade	$199
XER005	Xerox Pagis Pro 2.0	$209
XER007	Xerox Textbridge Pro 98	$49

HP ScanJet 5200C

HEWLETT PACKARD
Expanding Possibilities

HP's fast, accurate, Internet-ready colour scanner for great results every time - no experience required

The HP ScanJet 5200C Business Series colour scanner delivers quality results up to three times faster than other scanners. One button starts any project!

Best results for business

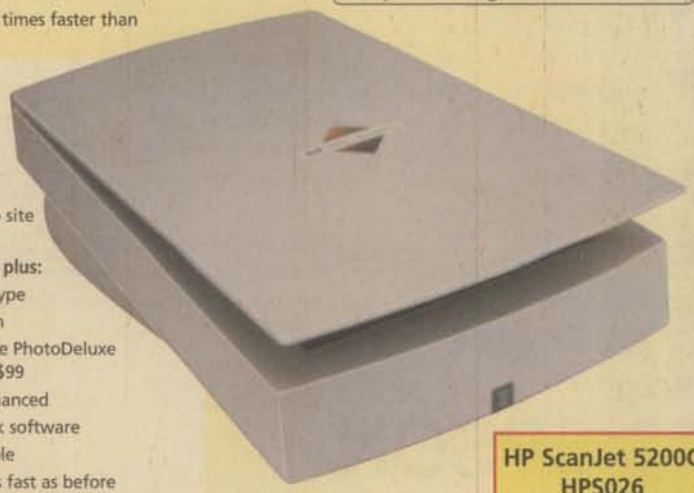
- HP's Intelligent Scanning Technology delivers crisp, accurate images every time
- Get photos, logos, drawings and text at optimal settings - in a single scan
- Preserve page format when you want to scan a whole document - and edit each element independently from one scan!
- Shrink or enlarge black-and-white drawings right in your application, with no worries about jagged effects!

Internet-ready results automatically

- Automatically links to popular e-mail and Web-creation software, so you can easily communicate over the Internet
- Supports multiple file formats ideal for Internet communications, including HTML, image PDF, GIF, JPEG, and more
- Automatically optimises scanned images and documents for sharp-looking Web pages
- Scans directly to your Web authoring applications to create or update your Web site quickly

All the features of the 4100C plus:

- Preview outline by region type
- Auto page format retention
- Additional software - Adobe PhotoDeluxe Business Edition, valued at $99
- 600dpi optical, 9600dpi enhanced
- On-line e-mail and web task software
- USB and Parallel Port capable
- Completes scan job twice as fast as before
- Scan line art for enlargement with no loss of quality



HP ScanJet 5200C
HPS026
$465

WebSearch Code: HPS026

SCANNERS

HP ScanJet 3200C

HEWLETT PACKARD
Expanding Possibilities

Easy to use scanner for excellent results

This one pass colour and mono flatbed scanner is so easy to use that you will be scanning in minutes. It offers a complete and versatile solution for photos, text and more. HP software guides you through each scan in a few easy steps and you can even pair it with your colour printer to make colour copies.

Features

- 30-bit internal hardware
- Maximum document size - 216mm x 297mm
- Supports multiple file formats
- Includes parallel cable and power cord
- Resolution 600dpi optical; 600 x 1200 hardware; 9600dpi enhanced
- Includes CD-Rom with HP PrecisionScan LT scanning software with OCR and Adobe PhotoDeluxe
- Less than 90 seconds for 4x6" colour photo, less than 2.5 mins for full page text, less than 2.5 mins for black & white drawing
- Enhanced parallel interface for Windows 95 or 98
- HP Intelligent Scanning Technology delivers great results automatically

HP ScanJet 3200C
HPS027
$185

WebSearch Code: HPS027

HP ScanJet 4200C

HEWLETT PACKARD
Expanding Possibilities

The easiest scanner for home

If you need an easy scanning solution, try the HP ScanJet 4200C. Everything you need for unmatched ease and convenience is right in the box, including software to scan, copy, make changes, store or print.

4200C Features

- Push button scanning, copying and emailing
- Dual image scanning
- 600 dpi optical
- Integrated OCR
- 36-bit colour image processor
- Scan direct to application (drag & drop)
- Guided workflow for quick results
- Front panel scan, copy and email buttons
- Easy to set up and fast operation with Universal Serial Bus (USB)

HPS034
ONLY $299

WebSearch Code: HPS034

MICROTEK ScanMaker 4

The MICROTEK ScanMaker 4 is both a professional quality flatbed scanner and a transparency scanner using Microtek's patented E.D.I.T. technology! Special film holders are used to scan slides & transparencies directly inside the scanner, thereby eliminating the loss of optical quality caused by glass. **Compared to cheaper scanners, the Scanmaker 4 delivers better line art, better shadow detail and improved clarity especially when scanning transparencies.**

Features:

- Patented E.D.I.T. technology
- 36 bit colour
- 1200x600 dpi optical
- 3 light sources
- Dynamic range 3.30
- Very Fast
- Includes Adaptec PCI SCSI

Bundled with professional software including

- Silverfast
- Scanwizard Pro
- MSP ColorSync scanner profile software
- Photoshop 5 LE
- Omnipage LE OCR

pc world
BEST BUYS

Microtek ScanMaker4
PRO528
$1379

WebSearch Code: PRO528

MICROTEK ScanMaker X6

The Microtek ScanMaker X6 offers a sharper image, much higher resolution, superior colour accuracy and much better shadow detail compared to entry level scanners. **A better scanner means you don't waste your time correcting every scan.**

The SCSI version includes a genuine Adaptec 1505AE SCSI card which lets you daisy chain other external SCSI devices (e.g. SCSI Zip drive, tape drive, CD writer, slide scanner).

Software bundle includes: Adobe PhotoDeluxe, ULead Photo Impact, Photo Assistant, OmniPage LE, Paper Master SE and ScanWizard!

AUSTRALIAN PC AUTHORITY QUALITY

Features:

- 36 bit (1 pass)
- 4 times the definition of entry level scanners
- 1200 x 600 DPI Optical
- 9,600 DPI Interpolated
- A4 Size
- Zero Reflection Design
- Digital Photography Magazine Editors Choice
- Advanced Image Enhancer
- Great bundled software
- Tri-linear CCD sensor array
- Dynamic range: 3.2

Microtek ScanMaker X6
SCSI
PRO523
$429

Microtek ScanMaker X6
USB
PRO033
$399

WebSearch Code: PRO523
WebSearch Code: PRO033

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HEWLETT PACKARD

Expanding Possibilities

Ink

Code	Type	Description	ISW Code	Price
51626A	Black	DJ 500/600, DW 500 & HP fax	HPI006	$59
51629A	Black	DJ & DW 600 series, OJ 590/635	HPI008	$59
51640A	Black	DJ1200C/1200C/PS & Designjet 230/250C/650/3xx/4xx/7xx	AUC118	$59
51641A	Tri-Colour	DJ800/850C/870CXI & OJ1150C	AUC123	$59
51645A	Large Black	DJ 850C/870C/880/890C/1600CM, DesignJet 750C/755CM & OJ1150C	AUC122	$59
51649A	Tri-Colour	DJ & DW 600 series, OJ 590/635	HPI007	$59
51645GA	Black	Deskjet 720c, 820cxi, 850c, 870 cxi, 890c, 1100c, 1600c, Designjet 700, 750c, 755cm and Officejet 1150c	HPI024	$39
C1823G	Tricolour	Economy Tricolour cartridge, HP Deskjet 720c, 890c, 1120c	HPI023	$49
C1823DA	Tricolour	Large Tricolour cartridge, HP Deskjet 720c, 890c, 1120c	HPI025	$65

Toner

C4092A	Black	LJ 1100 series	HWP001	$99

EPSON

Ink

Code	Type	Description	ISW Code	Price
S020191	Colour	Stylus 740	EPS335	$45
S020093	Black	Stylus 400/500/600/700/Photo/Photo Ex	EPS069	$39
T001011	Colour	Stylus 1200	EPS374	$65
S020187	Black	Stylus 440/640/1200	EPS334	$39
S020189	Black	Stylus 740	EPS333	$45

Paper

S041134	Photo	4x6"x 20 sheet	EPS164	$25
S041140	Photo	A4 20 Sheet, Stylus 700/EX/850	EPS321	$25
S041142	Photo	A3 20 Sheet, Stylus 700/EX/850	EPS322	$55
S041143	Photo	A3+ 20 Sheet, Stylus 700/EX/850	EPS325	$59
S041144	Stickers	5 sheets x 16 Stickers	EPS348	$15

Toner

S050010	Toner	EPL5700	EPS349	$195
S050005	Toner	EPL5500, approx 3000 page life	EPS350	$115

Canon

Ink

Code	Type	Description	ISW Code	Price
BCI10BK	Black	Refill 3 PACK BJ30/BJC70/BJC80	CAN086	$29
BC61	Colour	BJC7000 Series	CAN017	$79
BCI62	Photo	Replacement Ink BC62, BJC7000 Series	CAN227	$69
BCI21BK	Black	Refill BJ4000/5000/5500/MPC	CAN072	$19
BCI21C	Tri-colour	Refill BJ4000/5000/5500/MPC	CAN071	$39

Miscellaneous

Code	Category	Type	Description	ISW Code	Price
BC22EKIT	Ink+Paper	Photo	Refill Ink + Paper, BJC4200/4300/5000/MP	CAN065	$109
BC60	Print Head	Black	P/Head + Ink, BJC7000	CAN016	$85
BC10	Print Head	Black	P/Head W/BCI10K, BJ30/BJC50/70/80	CAN231	$75
BC20	Print Head	Black	P/Head + Ink, BJC4000/5500/MPC	CAN024	$65
BC11E	Print Head	Colour	P/Head W/BCI11BK,BCI11C, BJC50/70/80	CAN095	$79
BC21E	Print Head	Colour	P/Head + BCI21C,BCI21BK, BJC4000/5000/MP	CAN015	$89
IS22	Scanner Head	Colour	BJC4300	CAN099	$149
BCI110	Ink Tank	Colour	Replaceable Colour Ink Tank BJC70/BJC80	CAN084	$39

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We sell blank CD-R Discs for only $2.70 each

KODAK 74 MIN CD-R

KOD042	Kodak CD-R 74 min 8xKSP	$2.70
KOD043	Kodak CD-R 74 min 8xNSP	$2.70

Also Available:

PRI010	Princo CD-RW Media	$9.50
PRI006	Princo CD-R 80Min	$5.95
HPP024	HP CD-R 650MB Single	$3.90
HWP252	HP CD-RW Single	$29.00
SONY18	Sony CD-R 650MB 74Min 10-PK	$36.99
SONY33	Sony 3.5 DSHD Disk 10-PK	$8.50

iomega

Accessories & Media

IOM030	ZIP 100Mb Disks PC 10-PK	$189
IOM074	ZIP 100Mb Disks MAC 10-PK	$189
IOM086	ZIP 100Mb Disk MAC 1-PK	$25
IOM085	ZIP 100Mb Disk PC 1-PK	$25
IOM099	ZIP 100Mb Gigacolour Disks 2-PK	$45
IOM102	ZIP 250Mb Disks PC 10-PK	$579
IOM103	Zip 250Mb Disk PC 1-PK	$45
IOM112	Zip Drive 6 Disk Wallet	$29
IOM097	JAZ 2Gb Disk PC 1-PK	$199
IOM006	JAZ 2Gb Disk MAC 1-PK	$199
IOM089	JAZ 2Gb Disks PC 3-PK	$579
IOM078	JAZ 2Gb Disks MAC 3-PK	$579
IOM106	Clik! Disks 2 Pack	$65
IOM107	Clik! Disks 10 Pack	$175

STORAGE, MEDIA, CONSUMABLES

Verbatim Datalife Plus CD-R and CD-RW discs

Verbatim CD-R and CD-RW discs encompass the latest technology for superior performance. They feature a proprietary Metal AZO dye (which offers the best protection against sunlight), multi-speed recording, scratch-resistant, protective coating, a fully printable surface and across the board writer compatibility.

6x Spin

Single CD-R
VER043
$3

10 Pack CD-R Media
VER080
$29

Single CD-RW
VER081
$12.95

WebSearch Code: VER043
WebSearch Code: VER080
WebSearch Code: VER081

LaBelLe CD Labeller

NEW PRODUCT

Give your CDs the professional touch. This clever yet simple labeller lets you put neat and professional looking labels on to your CDs. Labels are available for both inkjet and laser printers.

Labeling a floppy disk is one thing, however, labeling a CD-ROM is quite another. Since the label on a CD must be placed exactly in the middle and may not overlap anywhere, you can either squint your eyes and hope for the best, or you can entrust the exact positioning to LaBelLe.

Modern CD-ROM drives with increasingly higher rotation speeds demand smaller and smaller tolerances. Through precise label centering, the Swiss made LaBelLe insures that the CD spins evenly and thus data readability is not corrupted.

- CD label applicator
- CD Software (PC/Mac)
- CD Labels (1440 dpi optimised)
- Inlay Cards

...simply the best labeling system on the market

LabelLe Starter Kit
LAB006
$45

JetGloss 20 Label Pack
LAB008
$25

JetColour Pro 20 Label Pack
LAB012
$22

WebSearch Code: LAB006
WebSearch Code: LAB008
WebSearch Code: LAB012

Imation SuperDisk LS120 Media

- 120MB storage capacity on each disk
- 83 times capacity of conventional 3.5" diskette
- laser servo pattern - 2490 tracks per inch
- high-density metal particle pigment and dual-layer coating technology

IMA004	Imation SuperDisk 3-PK	$75
IMA005	Imation SuperDisk 5-PK	$119
IMA006	Imation SuperDisk 10-PK	$219

Tape Media

HPP047	HP DLT IV Tapes	$155
TRA013	3M TR-3 3.2GB Tape 5-PK	$259
SEA155	Seagate Travan TRV Tape 5-PK	$259
SONY26	Sony 2-4GB 90M DAT Tape 5-PK	$55
SONY41	Sony TR4 4-8GB Travan Tape	$55
VER045	Verbatim 500MB/1.0GB TR-1	$39

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ORB Drives...Big Gigs

2.2GB Internal & External Unlimited Capacity

The ORB drive uses 3-1/2" removable media with a capacity of 2.2 GB, more than any other product in its category. At an impressive 12.2 megabytes per second maximum sustained data transfer rate-the fastest transfer rate of any removable media product available today-this drive is completely "video ready." The ORB also boasts a substantial increase in reliability over competitive products, with an estimated mean-time-between-failure rating 50 percent better than the competition.

- 3.5 hours of audio
- 2+ hours of video
- 2,000+ colour photographs
- equal to twenty-two 100mb disks
- SCSI, EIDE or Parallel Port versions
- 1500+ 1.44MB floppy disks

Internal EIDE
ORB002
$379

WebSearch Code: ORB002

iomega Buz

Multimedia Producer

Buz puts you in the director's chair!

Capture, edit and share video, digital photos, and sound using your computer.

- Get your multimedia stuff into your PC
- Personalise it using the easiest software around
- Share it with others using Zip or Jaz disks, VCR tape or even the Internet

Buz is a unique combination of hardware, software, tutorials, and high performance working together to let you produce your own cool multimedia projects. Create world-class presentations, home movies, capture, edit, add music and audio to your videos, and even create multimedia for Web sites. All on your PC.

What can you do with Buz? You're limited only by your imagination.

Capture Audio/Video and digital photos from a variety of sources:

- Get video from camcorders, VCRs, laserdiscs, or DVD
- Get images from scanners, CD-ROM, or Jaz and Zip disks with Buz's Ultra SCSI connection
- Capture audio from microphones, CDs or tapes

IOM080
$339

WebSearch Code: IOM080

Quantum Quality Hard Drives at Affordable Prices

QUANTUM 8.4 GB ONLY $259!

IDE

Drive	Model	Speed	Access Time	Price	Code/WebSearch
Fireball CX 6.4GB	QM306400CX-A	5400rpm	9.5ms	$239	QUA170
Fireball CR 8.4GB	QM308400CR-A	5400rpm	9.5ms	$259	QUA176
Fireball CX 13.0GB	QM313000CX-A	5400rpm	9.5ms	$339	QUA177

FOR FURTHER INFORMATION, OR PRICING ON HARD DRIVES NOT FEATURED, PLEASE CALL OUR SALES TEAM ON 1300 300 003

REMEMBER: HARD DRIVE PRICES FLUCTUATE - CALL FOR LATEST PRICE

Need more Space? Get a Seagate Ultra-ATA Hard Drive Upgrade Pack

Everything You Need for a Successful and Easy Drive Installation on your Pentium or equivalent PC

Seagate Model	ST36421A	ST38421A	ST310232A	ST313032A	ST317242A
Formatted Capacity	6400MB	8400MB	10200MB	13000MB	17200MB
Seek/ms	10.5	9.0	9.0	9.0	9.0
Spindle Speed	5400RPM	5400RPM	5400RPM	5400RPM	5400RPM
Data Buffer	256K	512K	512K	512K	512K
Form Factor	88.9mm	88.9mm	88.9mm	88.9mm	88.9mm
Transfer Rate	33.3/66.6ms	33.3/66.6ms	33.3/66.6ms	33.3/66.6ms	33.3/66.6ms
Stock/WebSearch Code	SEA202	SEA203	SEA204	SEA205	SEA206
Price	$299	$319	$369	$399	$549

The upgrade pack includes:
- Full step-by-step installation guide
- Wrist Strap to prevent static electricity from destroying your CPU or your RAM when installing your new hard drive
- Seagate Ultra-ATA Hard Drive
- 3 year warranty
- Frame kit, screws and mounting brackets

ORB004	ORB External Parallel 2.2GB Drive	$425
ORB005	ORB Internal SCSI 2.2GB Drive	$379
ORB006	ORB External SCSI 2.2GB Drive	$425
ORB007	ORB External USB 2.2GB Drive	$579
ORB003	ORB 2.2GB PC format Disk	$75
QUA178	Quantum Atlas IV 9.1GB Wide Ultra	$699
QUA179	Quantum Atlas IV 9.1GB Ultra SCA	$739
QUA181	Quantum Atlas IV 18.2GB Ultra SCA	$1549
IOM030	ZIP Disks PC 10-PK	$185
IOM102	ZIP Disks 250MB PC 10-PK	$319
IOM097	JAZ 2GB Disk PC Single	$199
IOM103	ZIP Disk 250MB Single	$35
IOM099	ZIP Disks Gigacolour 2-PK	$39
IOM074	ZIP Disks MAC 10-PK	$179
IOM120	Iomega Clik! PC Card Drive	$375
IOM116	Iomega Clik! Drive Plus	$539

The Big Capacity, Take-It-Anywhere Drive

iomega

zip 250

It's light. It's portable.

And now, with 250MB at your fingertips, it holds more files than ever before. 250MB Zip disks are big enough to handle just about anything - the equivalent of 170 floppies! And unlike CD-ROMs, you can rewrite to Zip disks. Slip it in your backpack. Place it in your briefcase. At less than 0.5kg, the 250MB Zip is the easiest way to take your important files wherever you go.

And don't forget, you can use 100MB* Zip disks in your 250MB Zip drive. So you've got the best of both worlds. With over 100 million Zip disks sold, the 250MB drive is the only way to go for collecting, creating and sharing your files.

NEW LOW PRICE

Iomega Zip Drive 250 (Parallel)
IOM100
$289

Iomega Zip Drive 250 (SCSI)
IOM101
$289

* 100MB capacity where 1MB=1million bytes. The capacity reported by your operating system may differ.

WebSearch Code: IOM100
WebSearch Code: IOM101

Storage & Hard Drives

Iomega Zip Starter Kits

Everything you need to get started:

Parallel port Zip drive
- back up your hard drive
- take your stuff with you
- use it like a hard drive

4 genuine multicoloured 100MB Zip disks
- each disk holds up to 70 floppies
- great for multimedia
- colours help organise

IOM096
$249

WebSearch Code: IOM096

What can you do with Zip disks?

Zip disks are big enough to handle just about anything. Whether you've got family photos, downloads from the Internet or your favourite music, Zip disks have tons of room to hold it all. Unlike CD-ROMS, you can rewrite to Zip disks. And with a Zip drive sold every 5 seconds, you can rely on having access to your stuff, virtually anytime, anywhere.

Full range of Iomega Products available

Iomega ZIP USB

The SuperFloppy used by millions - for USB connections!

The perfect companion for iMac & PCs with windows 98.

- **Easy to connect** - just plug it into your USB port, and you're ready to go
- **Hot swappable** - switch with other USB devices without turning off your computer
- **Fast, unlimited capacity** - add 100MB* at a time
- **Reliable** - use it like your hard drive - save your files and run your software
- **Compatible with 100MB* Zip disks** - over 100 million disks sold

IOM098
$245

WebSearch Code: IOM098

Iomega Clik! PC Card Drive

The compact, go-anywhere storage solution

A lightweight and highly mobile removable storage drive, the Clik! PC Card Drive fits into the PC card slot of most notebook computers. It comes ready to run and with no extra cables or batteries, is easy to install and use. Clik! disks hold an amazing 40MB of information and provide the ideal low-cost, high-capacity removable storage solution for storing data on the run. The Clik! PC Card drive also includes Iomega's productivity enhancing QuikSync and Copy Machine which enable users to develop a complete and reliable backup and storage solution.

IOM120
$375

WebSearch Code: IOM120

jaz 2GB Who said size doesn't matter?

When it comes to multimedia, the super fast, extremely vast personal storage drive from Iomega thinks it does. Jaz drives and disks offer the ideal solution for storing, transporting and playing multimedia applications. You can pack up to 2 gigabytes on each disk, and there is no limit to the number of disks you can use. Speedy access times and rapid transfer rate mean you can quickly and easily move files around. The Jaz drive can handle even the most demanding usages, including full-screen full motion videos!

Iomega Jaz 2GB (Ext)
IOM083
$645

Iomega Jaz 2GB (Int)
IOM082
$690

WebSearch Code: IOM083
WebSearch Code: IOM082

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* where applicable

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10.00am 'til 3.00 pm (EST) Saturday

TERMS & CONDITIONS

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Xircom RealPort Ethernet 10/100 + Modem 56

The RealPort Ethernet 10/100+Modem 56 combines 10/100Mbps Ethernet, 56K modem, GSM, AMPS cellular and ISDN connectivity, in a single cable-free Integrated PC Card solution. GlobalACCESS features make it easy to connect to information from any location, anywhere in the world.

The revolutionary RealPort Integrated PC Card family solves the number one problem mobile users experience with PC Cards today—lost, forgotten, or broken cable connectors and broken pop-out jacks. Patented RealPort Integrated PC Cards provide robust and reliable communications by integrating connectors directly into the card. With RealPort Integrated PC Cards there are no cables and no hassles. Connecting to information in the office or on the road has never been easier.

WebSearch Code: XIR048

XIR048 **$619**

Xircom RealPort Modem 56

The Xircom RealPort Modem 56 offers mobile users high-speed 56K modem functionality in a robust Integrated PC Card with built-in connectors.

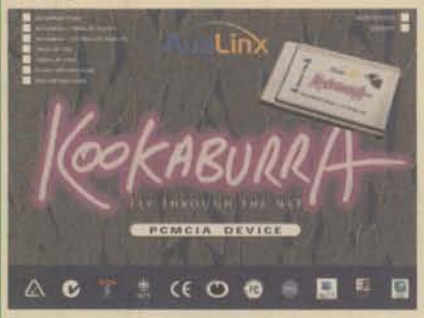
Features & Benefits:
- Integrated modem and telephone handset pass-thru connectors provide reliable cable-free connectivity
- LEDs for status information at a glance
- Telephone handset pass-thru allows receipt of incoming calls without disconnecting the modem cable
- Digital Shield protects modem from high-current digital phones lines
- Supports wide range of network operating systems including Windows 95/98 and Windows NT
- Wake-on-Ring reduces power consumption by detecting the ring of an incoming call and allowing receipt of information when the system is powered down
- Integrated PC Card reduces support calls, user down time and eliminates cable replacement

WebSearch Code: XIR064

XIR064 **$259**

Kookaburra 56K 10/100 Base Ethernet combo PC-card

Now, you can stay in touch with your office and your clients any time you wish. Whether you need to connect to an on-line service or fax your latest proposal, AusLinx's PCMCIA Fax Modem PC cards are ready to travel. Because with our "no hassle" installation, mobile communications is just a phone call away. And with the low power requirements mobile professionals demand, keeping in touch has never been easier.



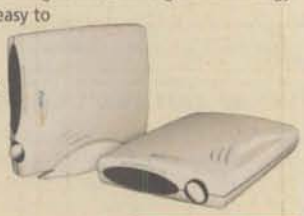
- Dual mode 56K/flex /V.90 modem
- 10/100 base ethernet card
- Simultaneous networking and fax modem operations
- PCMCIA Device
- 5 years warranty
- 100 hours Internet Starter Kit

WebSearch Code: AUS537 AusLinx

AUS537 **$399**

Tasmanian Devil

Bridging the gap between current analog transmissions rates and fully digital communications, the AusLinx Tasmanian Devil 56k modem offers substantially faster speeds without having to invest in digital technology. Package all this into one easy to use and easy to install Tele-communication device and thanks to the Tasmanian Devil 56k modem, you have everything you need to talk and connect to the world with ease.



- Auto select - 56K flex/V.90
- Rockwell chipset
- 1300 help desk
- 5 years warranty
- Headset with microphone

WebSearch Code: AUS536 AusLinx

AUS536 **$179**

Little Devil USB - Devilishly Fast

- 56K Flex/V.90 Auto Select
- Low power 3.3v (for notebook use)
- Compact Lightweight design (50gms)
- Toll free Australia wide help desk
- 5 years warranty
- Webstation Station
- 100 hours Internet Starter Kit

WebSearch Code: AUS535 AusLinx

AUS535 **$189**

ABC PC Card Modem

- Dual mode 56K flex/V.90
- Smart voltage
- Webstation software
- 1300 help desk
- 5 years warranty
- 100 hours Internet Starter Kit
- Able to work with notebooks using popular operating systems such as Windows 3.1, 95 & 98

WebSearch Code: ABC005 AusLinx

ABC005 **$159**

The Brick

- Auto select - 56K flex/V.90 external
- Call back security
- Video conferencing
- Fax modem
- Password protection
- Internet Alarm
- Headset with microphone
- In-built microphone
- Volume control dial
- 1300 help desk
- 5 years warranty
- 100 hours Internet Starter Kit

WebSearch Code: AUS538 AusLinx

AUS538 **$239**

ABC Modems

ABC Internal Modem

This has to be the cheapest way that you can get onto the net! For only $79 you get this fast, simple to use, easy to install, best selling modem. The 56K. V90. internal modem is perfect for users of all levels and ideal if you are limited for working space.

- Auto Select - 56K flex/V.90
- Webstation software
- 100 hours Internet Starter Kit
- 1300 help desk
- 5 years warranty

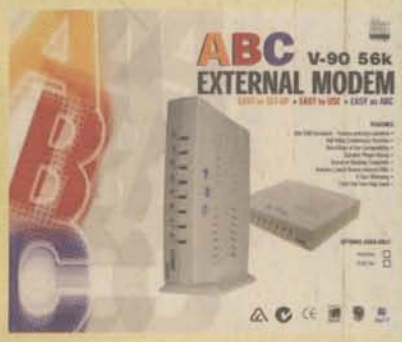
ABC004
$79

WebSearch Code: ABC004

ABC External Modem

An excellent value external modem with exceptional quality and speed! The ABC 56K Flex V90 modem is an amazing offer at only $99. This compact modem can be stored either horizontally or vertically for minimum use of space. All ABC modems come with a standard 5 year warranty.

- Auto select - 56K flex/V.90
- 1300 help desk
- 5 years warranty
- Headset with microphone
- Webstation software
- 100 hours Internet Starter kit



ABC003
$99

WebSearch Code: ABC003

MODEMS

NetComm Roadster II 56 Voice, Fax Data Modems

Using the latest telephone exchange technology, the NetComm Roadster II 56 voice, fax, data modems deliver much greater speed. So now the World Wide Web is made much more exciting - with super fast downloading of graphics, games and multimedia. With Simultaneous Voice and Data (SVD) functionality, you can speak to the person you are sending data to at the same time, over the same telephone line, without having to make an additional call. While playing your favourite games, speak to and hear your competitors' reaction as you blast them away!

Ultra

NET147
$245

WebSearch Code: NET147

USB

NET028
$225

WebSearch Code: NET028

Banksia

WaveSP 56

FREE WEB & INTERNET SOFTWARE

The fully featured 56,000bps modem!

Includes:

- High speed data transmission at 56,000bps (v.90 standard)
- Microsoft Internet Explorer for Internet surfing & Web site construction
- Simultaneous voice & data (SVD) transmission
- Full duplex speakerphone (hands free telephone)
- Fax transmission at 14,400bps
- Fully featured smart answerphone with multiple voicemail boxes
- A radical new shape for optimum audio performance
- The best new games

5 YEAR WARRANTY

BAN003
$225

WebSearch Code: BAN003

3Com
More connected.

GET CONNECTED TO THE NET!

3COM U.S. Robotics 56K* Voice Faxmodem

Includes V.90 ITU 56K standard and x2 technology

Experience the Internet like never before! Grab graphics-rich Web pages, e-mail, huge data files, real-time sound and video faster, play intense games, get more done online. Compatible with both the V.90 ITU 56K standard and x2™ technology. Includes a CD-ROM jam-packed with great software for work and play.
Visit www.3com.com/56k for a compatible Internet provider near you or call us on 1300 300 003.

Key Benefits:

- Number 1 selling modem in the world
- Brings you great Web sites faster
- Software upgradable for future enhancements

USR104
$219

WebSearch Code: USR104

3Com U.S. Robotics 56K* External Professional Message Modem

3Com's new range of 56Kbps V.90 standard desktop modems - the 3Com U.S. Robotics 56K V.90 External Professional Message Modem and 3Com U.S. Robotics 56K V.90 External Message Modem - enable users to meet all of their data, voice and message management needs with a single product, guaranteed to provide an enhanced and productive Internet experience.

Features:

- Faster Internet access
- Caller ID
- One-button access to voice messages
- Remote retrieval of voice messages through a dial-up connection
- Built-in high quality speakerphone
- Easier installation and use
- V.80 (video conferencing) capable
- Software upgradeable for future enhancements
- Backed by a Lifetime Limited Warranty
- Valued-added Connections CD-ROM Software

USR105
$289

WebSearch Code: USR105

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Fly Video 98

NEW PRODUCT

Fly Video 98 enables Windows 98 users to receive and display television data such as internet information, and enhanced television programmes that combine television with data related to the programmes. Users of Windows 98 will also have access to a program guide allowing them to view a schedule of TV shows, then instantly tune into show for viewing on the PC. A full installation guide and user manual are provided, and the absence of jumpers, feature connectors and dip switches means that Fly Video 98 installs easily into a spare PCI slot. Supporting continuous AVI file capturing up to 30 frames per second, Fly Video 98 has a capture and image quality up to 640 x 480 (NTSC) and 768 x 576 (PAL).

Fly Video 98 FMR with Remote Control + FM Radio Tuner
ASS027
$189

ASS026
$139

WebSearch Code: ASS026
WebSearch Code: ASS027

Life TV USB

Now you can watch TV, play your favourite movie, video conference, edit your own video files, or send video e-mails from a single product connected to your USB port.

The all new USB LifeTV is the latest offering from Lifeview. LifeTV allows you to receive TV programmes and capture the live video into AVI files, turning your PC or notebook into a versatile TV station for terrestrial and cable TV reception.

LifeTV captures up to 30 frames per second at CIF format, and provides a high quality motion video to suit your action.

With hot plug and play capabilities, there is no need to turn off your PC when installing. And as an external USB device with low power consumption, it is ideal for notebook computers.

USB port required. Windows 98 only.

Features & Benefits:
- Full motion capture (352x288 at up to 30fps)
- Single frame capture using software snapshot or unique hardware snapshot (up to 640x480)
- Video capture from TV tuner, or any externally connected device (such as VCR or Camcorder)
- Send Video mail messages over the Internet using Video Live Mail
- USB Plug-N-Play
- Twain compatible for software snapshot directly to any picture editing software which supports twain scanners

Bundled with:
- NetMeeting for Video Conferencing
- Cyberlink Video Live Mail, Greeting Card, and Image Browser

WebSearch Code: ASS025

ASS025
$299

RoboCAM

USB DigitalCamera
- Plug & play (USB) interface for easy installation
- Capture up to 30fps (352 x 288 pixels) full motion video
- Support single frame snapshot up to 640x480 pixels
- Low power consumption ideal for notebook computers
- Support TWAIN interface for image editing applications
- Crystal clear picture
- No video capture card or power adapter necessary

WebSearch Code: ASS023

ASS023
$179

Robo Snoop

NOW WITH FREE INTERNET PHONE VALUED AT $69

RoboCam USB Digital Camera Plus PC Snoop

Video Conferencing, Personal Surveillance/Receptionist & Message Recorder Combined. "Robo Snoop" will allow users the option to perform video conferencing, surveillance, video capture, receptionist duties & message recordings, all for a great price.

RoboCam USB Camera delivers crystal clear pictures with the latest CMOS 300K technology.

PC Snoop integrates Stealth surveillance & Video Message Recording for Home & Office applications.

ALSO AVAILABLE IN BLUEBERRY iMAC

WebSearch Code: ASS017

ASS017
$275

Now Available in Blueberry iMac

Colour co-ordinated for the fashion conscious users. The stylish blueberry will enhance the normally boring PC's.

WebSearch Code: ASS024

ASS024
$179

VOO003	Voodoo3 2000 PCI	$349
VOO004	Voodoo3 2000 AGP	$549
VOO001	Voodoo3 3000 AGP	$439
VOO002	Voodoo3 3500 AGP	$679
HAU001	Hauppauge WinTV-Primio	$199
HAU002	Hauppauge WinTV-PCI Card	$269
HAU003	Hauppauge WinTV-Radio	$349
ASS022	AiTech CapView	$139
IOM080	Iomega BUZ	$339
LOG093	Logitech QuickCAM Pro USB	$299
PIN025	Pinnacle Miro MP10	$699
LAK110	MiroVideo DC30 Plus	$1949
LAK115	MiroVideo DV300 Capture Card	$1365
CRE052	Creative Blaster Banshee 16MB AGP OEM	$229
CRE055	Creative GraphicsBlaster Riva TNT 16MB (PCI)	$235
CRE049	Creative GraphicsBlaster Riva TNT 16BM (AGP)	$235

TURN ORDINARY VIDEOS INTO EXTRAORDINARY VIDEOS WITH

Studio DC10 Plus

Features:

- Pinnacle's award winning Studio editing software which offers users simple drag and drop editing, plus 100s of special effects.
- TypeDeko titling software for giving your productions professional looking titles.
- SmartSound Studio software for generating background music and for adding narration or a CD soundtrack to your movies.
- Microsoft Direct Show technology for instantly previewing your movie.
- The ability to output AVI files for the internet.
- Microsoft Net Meeting software for video conferencing.
- Hot Keys unlimited free technical support and 60-day money back guarantee.

Internal/External	Internal
Disk Space (1/2 hr vid)	1.5GB-10GB
Max Resolution Capture	760x576
	50 fields/sec
Output	768x576
	50 fields/sec
Import AVI files	Yes

Note: Studio DC10 Plus replaces: Miro DC10, Miro DC20, and Miro DRX

RECOMMENDED PC REQUIREMENTS

Processor	P233 or Celeron 300A
Hard Drive	8GB
RAM	64MB
SCSI Drive	Yes*
Operating System	Win95/98

** Required for capture rates above 3MB/Sec.*

PIN024

$599

WebSearch Code: PIN024

MULTIMEDIA

Rio 500

NEW PRODUCT

The Rio 500 puts the power of digital audio in the palm of your hand!

Rio 500 is a portable digital audio player that stores up to 2 hrs of digital-quality music and up to 32 hrs of spoken audio programs. Access thousands of music and audio files at RioPort.com and over 16,000 hours of Audible.com audio programs. Instantly create, customize and mix your favorite music and audio selections.

- 64MB onboard memory, expandable to 96MB with removable flash cards (supports future memory expansions)
- USB support for fast downloads with Windows or Mac
- Skip-free design - no moving parts
- Full version Rio Audio Manager 2.0 for encoding, managing, and playing digital audio files (free RioPort registration required)
- Three new cool colors: metallic gray, translucent teal and purple

Teal Rio 500
DIA061

$529

WebSearch Code: DIA061

A New Era in Gaming Graphics!

NEW PRODUCT

Diamond's Stealth III S540 ushers in a new era in PC gaming!

Stealth III is the ultimate in graphics value!

- S3 Savage4 Pro+ for leading graphics features with 128-bit 2D, 3D and video engine
- Available in PCI and AGP 4X (compatible with all AGP slots including AGP 2X/1X) for awesome graphics display
- Life like 3D image quality featuring S3TCTM texture compression
- 128-bit Windows acceleration for lightning-fast high resolution
- 32MB of high-speed memory for high resolutions to 1920x1080
- Hardware-accelerated DVD to view full screen DVD (MPEG-2) (AGP version only) and MPEG-1 videos
- Direct3D and OpenGL support for today's hottest games and software

*Box shown for illustration purposes only

DIA062

$245

WebSearch Code: DIA062

ViperV770

Wreak Havoc with the Ultimate 3D Weapon

Experience unrivalled graphics performance with Diamond's Viper V770! Viper V770 lets you fly through high-intensity games and demanding Windows and NT business and graphics applications with the highest quality 3D graphics, rapid-fire 2D speed, and breathtaking cinema-quality video.

Key Features

- NVIDIA RIVA TNT2 for high-speed 3D graphics
- TwiN Texel engine with single-pass multi-texturing for lifelike rendering of the most complex 3D scenes
- 32-bit rendering & 32-bit Z/stencil buffer for razor-sharp images
- Resolution support up to 2048x1536
- Rapid-fire 128-bit 2D acceleration with explosive colour
- 32MB high-speed memory and up to AGP 4X for rapid-fire graphics display
- Supports the latest processor technologies from both Intel and AMD

** Box Shown for Illustration purposes only*

Diamond Viper V770
16MB
DIA058

$239

Diamond Viper V770
32MB
DIA059

$339

WebSearch Code: DIA058
WebSearch Code: DIA059

Pocket Scan Converter (PSC 1106)

Your business presentations on the big screen

Using the Pocket Scan Converter in conjunction with your notebook computer (or PC), any presentation can be displayed on a TV or recorded onto video tape, making the Pocket Scan Converter ideal for business, education and training applications. This compact device simply plugs into your notebook/PC and the other end into a TV/Video to put your presentation onto the big screen. And when the work is done, play computer games on your TV. Designed with flicker reduction circuitry and VHS support, the Pocket Scan Converter produces extremely vivid, high quality images with up to 16.8 million colours.

ASS001

$189

WebSearch Code: ASS001

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Compro Flat Panel Speakers

Compro Flat Panel Speakers with NXT technology. Super slim and light loudspeakers with awesome audio performance. The NXT advent is in keeping with the explosive advances in information technology. NXT is pre-eminent in applications where synchronicity between image and sound is important.

Features
- Compatible with any audio source DVD / CD / Cassette / Nintendo / Play Station / Sega
- NXT Flat panel technology
- Super slim and lightweight
- 20W rms power output subwoofer
- Frequency response 50Hz -20KHz
- Magnetically shielded
- CE/GW compliance safety

AVAILABLE IN BLACK OR OFF-WHITE

NEW PRODUCT

Black Speakers CMP020 **$99**

Off-White Speakers CMP014 **$99**

WebSearch Code: CMP014

Compro CDRW 4420-NB

NEW PRODUCT

The Compro CDRW 4420-NB is one of the world's first CD re-writers with CD recording, rewriting and reading function all in a slim 23mm height housing. Notebook users can now enjoy the convenience of CD writing and rewriting all on one single drive. Available for both USB and PCMCIA ports.

Users will enjoy the unsurpassed performance of 4x CD writing and rewriting as well as 20x CD reading.

Bundled with
- Easy CD Creator
- Direct CD software
- Compro 16 CD holder
- Sample CD-Recordable Media
- Sample CD-Re-writable Media

PCMCIA CMP016 **$959**

USB CMP015 **$959**

WebSearch Code: CMP015
WebSearch Code: CMP016

Compro Internet Phone Kit

Easy To Install

COMPRO EZfone is a Plug and Play card for PC with Internet access. A simple software installation is needed to make the PC to work with EZfone.

Easy To Use

COMPRO EZfone takes the pain out of making Internet phone calls. The laborious and complex task of making an Internet phone call using software, microphone and speaker is now reduced into direct dialing from any regular phone or cordless phone without operating the PC.

The process of establishing connection is totally automated. Users are no longer bound to the PC as he can make his Internet phone call using his cordless phone. The concept is simple. User will dial the recipient's telephone number and talk to the receiving party. If the receiving party has EZfone installed and agreed to communicate over the Internet, the calling party just press the # key on the phone. Both PCs will then dial into the Internet service provider and establish an Internet connection automatically. Upon successful connection, both parties will be alerted to pick up the phone for a relaxing chat without worrying about phone bills.

Outstanding Voice Quality

COMPRO EZfone has effectively eliminated poor voice quality commonly found in other Internet telephony products by deploying a dedicated 40 MIPS Digital Signal Processor.

CMP012 **$249**

WebSearch Code: CMP012

Compro PS39 Digital Video Camera-USB

COMPRO PS39 Digital Video Camera offers great convenience of plug and snap on any Windows PC or notebook. Simply connect the camera to the USB port, a quick software installation and you are ready to take a brilliant picture, or video conference at life like frame rates.

Superior features:
- 40 frames per second (video images)
- 1280 x 960 resolution at 16.8 million true colour still images
- Superior image quality without compression
- Adjustable focus Lens (10mm to Infinity)
- Night vision capability
- Plug and Snap on all PC and note-book USB ports
- Includes PS2/AT Keyboard Adaptor, removable tilt and swivel base assembly, user manual

Great for:
- Personalised greeting card and t-shirt transfer
- Picture & Video E-mail
- Video Conferencing
- Internet Home Page creation
- Jazz up reports/presentations
- Picture ID
- Digital photo album and more...

Comes with CD containing:
- SnapShot Image Capturing Software
- AVI Software Driver
- TWAIN Software Driver
- Microsoft NetMeeting 2.0 Video Conferencing Software
- ULEAD Video Studio Software
- Compro Microphone

PC Multimedia PC · CE · Microsoft Windows Compatible

CMP013 **$279**

WebSearch Code: CMP013

DAE002	Daewoo 14" 1431X Colour Monitor	$249
DAE003	Daewoo 15" 518B Colour Monitor	$299
DAE004	Daewoo 17" 1710B Colour Monitor	$599
UMA016	Umax MaxiVision B5 15" Monitor	$349
UMA017	Umax MaxiVision B7 17" Monitor	$649
UMA018	Umax MaxiVision B7 Plus 17" Monitor	$939
HPV004	HP 15" Monitor	$449
HPV005	HP 17" Monitor	$799
HAN002	DigiPix AXIS Digital Camera	$269
AGF002	AGFA ePhoto 780	$699
KOD046	Kodak DC240 Digital Camera	$1299
KOD045	Kodak DC265 Digital Camera	$1799
BAY109	Netgear 10/100Mb Ethernet PCI	$65
BAY165	Netgear 100Mb Network Starter Kit	$239
DLK016	D-Link Network Starter Kit	$169
USB001	USB 4 Port Hub	$69

Fast Ethernet Network Kit

D-Link
Building Networks for People

DFE-905 (includes 4-port Dual Speed Hub & 2 PCI-bus 10/100 Ethernet cards)

Ready Made for Small Offices & Home Offices

This kit includes everything that you need to set up for a network. All you have to do is plug in the cables and run the network. Backed up by DLink's lifetime warranty and lifetime support, it's the safest and easiest way to hook users up on a network.

NEW PRODUCT

Features

- Network Kit for SOHO user
- Easy to install
- Includes two Cat5 20 feet cables and AC power adapter for hub
- Simple Plug-and-play installation
- 10/100 Mbps Network Kit
- Includes 1 dual-speed hub and 2 auto sensing 10/100 Mbps network cards
- All necessary network cables provided
- Simple plug and play installation
- Runs Windows 95, 98 NT, Netware, others

FCC Class B, CE Mark, VCCI Class B, BCIQ

WebSearch Code: DLK017

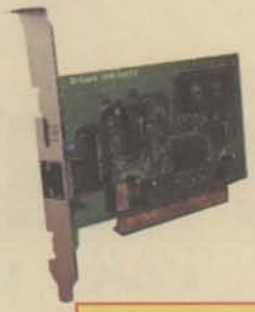
DLK017 **$289**

NETWORKING

Ethernet Interface Adapter

DFE-530TX PCI-bus 10/100M Fast Ethernet Network Interface Card

- Intelligent Ethernet/Fast Ethernet Adapter, Auto negotiating 10Base-T/100Base-TX (Nway)
- Plug and Play support. Low CPU utilisation. 32 Bit high performance
- Optional remote boot rom. Certified driver for Netware, SCO Unix, Windows 95 and Windows NT



WebSearch Code: DLK004

DLK004 **$49**

DLK018 DFE-650 TX Fast ethernet 10/100 Dual Speed N-way PCM1A Card with RJ-45 connectors **$179**

10/100Mbit NWay Dual Speed Hub

DFE-904

- IEEE 802.3 10BASE-T Ethernet repeater
- IEEE 802.3u 100BASE-TX Class II Fast Ethernet repeater
- 4 Ethernet or Fast Ethernet ports
- MDI-II uplink port for easy expansion
- Selection between Ethernet and Fast Ethernet via switch
- Extensive diagnostic LEDs
- Compact size, light weight

WebSearch Code: DLK020

DLK020 **$185**

DLK021 DFE-908 DX 8 port 10/100 Mbps Dual Speed Desk Top Hub with switching. Stackable **$329**

DLK022 DFE-916 DX 16 port 10/100 Mbps Dual Speed Desk Top Hub with switching. Stackable **$969**

DLK028 External 56K V90 Data/Fax/Voice Modem **$109**

DLK029 Internal 56K V90 Fax Modem **$49**

4 Port USB Hub

DU-H4

NEW PRODUCT

- 4 USB A-type ports for USB device connection, 1 USB B-Type port for Upstream connection to PC or another USB hub
- User selectable as self powered or bus powered. 6 LED indicators for power and port status. 6 foot 'A' to 'B' cable

WebSearch Code: DLK024

DLK024 **$75**

DU-H3SP

NEW PRODUCT

- 3 USB A-type ports for USB device connection, 1 USB B-Type port for Upstream connection to PC or another USB hub
- 1 Serial and 1 Parallel port for non-USB device connection. User selectable as self or bus powered. 6 foot 'A' to 'B' cable

WebSearch Code: DLK025

DLK025 **$159**

2-port Internet ready Server for SoHo Networks

DP-602

- 1 x 10/100Mbs NWAY Ethernet Port, 2 x RS-232 460kbs Com Ports. Supports NAT for single ISP user account, Dial-on-Demand
- Admin through Windows based program, Web browser and telnet
- Ethernet Print Servers
- DHCP, PPP, PAP/CHAP Security. Dual use of Com ports for double bandwidth. Support for Analog modem or BRI ISDN TA

WebSearch Code: DLK026

DLK026 **$495**

1-port Pocket Size Ethernet Print Server

DP-101

- Support Windows NT, Windows 95, UNIX , TCP/IP, IPX , NetBEUI and Appletalk protocols
- With 10 Mbps Ethernet UTP interface. Supports 1 Parallel Printer via connection to Centonics port
- Supports up to 36 Novell Netware file servers, Easy configuration through Windows, Telnet

WebSearch Code: DLK023

DLK023 **$239**

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* where applicable

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COREL WordPerfect Office 2000

Finally, an office suite that understands the way you work. Perfect for your business, it's packed with features that make life easier. Increase productivity with voice-enabled word processing. Share files across most major applications and customise programs with support for Microsoft Visual Basic for Applications. Create your own business material, such as letterhead and brochures. Produce spreadsheets that give data real meaning and slide shows that really make an impact, and publish Web pages from the core applications, without knowing HTML.

It's all about getting the job done right, with suite-wide integration, you can combine text, graphics and charts in one document. WordPerfect Office 2000. Today's office solution.

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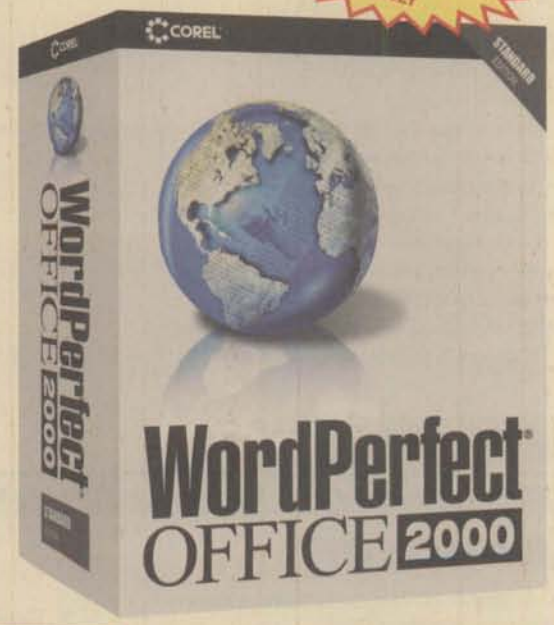

WordPerfect Office 2000

Corel Presentations 9 - Create captivating, high-quality slide shows and drawings that leave a lasting impression with this dynamic presentations application. Enhanced Microsoft PowerPoint import/export capabilities. Redesigned Internet Publisher gives you step-by-step instructions on publishing a slide show to the Web.

Quattro Pro 9 - Turn numbers into meaningful information with this powerful spreadsheet program. Organise, analyse, report, manage and share data quickly. Increased notebook size now supports up to one million rows, giving you greater flexibility when converting Microsoft Excel files. Enhanced Microsoft Excel conversion capabilities.

WordPerfect 9 - Professional word processor, create outstanding documents, such as newsletters, reports, brochures, add graphics, charts and tables with ease. Enhanced Microsoft conversion capabilities. Corel RealTime Preview lets you preview formatting before applying it to your documents.

CorelCENTRAL 9 - Manage time and tasks efficiently with this effective information manager. Organise, store, and access communication and scheduling information with ease. PalmPilot Synchronisation lets you synchronise the Calendar, Event & Task Lists, Address Book & Memo applications.

Trellix 2 - Quickly organise documents and publish them to the Web without knowing HTML. Increase the availability of information throughout a corporation and reduce the workload by delegating content ownership to specific individuals.

WebSearch Code: COR560
WebSearch Code: COR548
WebSearch Code: COR546

Corel Word Perfect 8 for Linux
COR560
$89

EDUCATIONAL pricing AVAILABLE

Corel Office 2000
COR548
$499

Corel Office 2000 U/G
COR546
$199

WordPerfect Office 2000 Voice-Powered Edition

Includes all the applications in Office 2000 plus:

Philips FreeSpeech 2000

- Use the power of your voice to create, edit and format documents in WordPerfect 9. Philips FreeSpeech 2000 uses High Speed, High Accuracy technology to dramatically improve recognition rates
- Supports dictation by multiple users in multiple languages
- EasyEdit lets you playback text for easy proofreading
- Explore the Web with your voice
- Voice-enhanced word processing means users can watch their words appear on screen as they speak to their computer at a normal pace up to 160 wpm

WebSearch Code: COR549
WebSearch Code: COR547

Corel Office Voice
COR549
$459

Corel Office Voice U/G
COR547
$259

Corel VENTURA 8

Powerful Publishing – Professional Results

Whether it's for paper, for the Internet or preparing documents to be converted to portable electronic files, Corel VENTURA 8 satisfies all your desktop publishing needs. With high performance and ease-of-use, this page layout and design application has enhanced features that save you time and money. Improved integration lets you move across applications seamlessly. Work on the same document as other users with unique multiuser access. Quickly manipulate your workspace to suit your needs with innovative usability features such as task-specific toolbars. And publish to the Internet easily with better-than-ever creation of HTML pages and hyperlinks to URLs, files, chapters and frames. Corel VENTURA 8 – ideal for the professional!

Applications

Corel VENTURA 8
Corel DataBase Publisher
Corel PHOTO-PAINT 8
Corel WordPerfect 8

WebSearch Code: COR331
WebSearch Code: COR565

Corel Ventura 8
COR565
$799

Corel Ventura 8 Upg
COR331
$339

Corporate Licence

Licencing-keeps you legal and reduces cost! As more and more organisations realise the benefits of centralising their software purchasing, the Software Warehouse specialised licencing team has become an absolute necessity for many IT Buyers. The Software Warehouse Corporate Licencing team are knowledgeable and dedicated team members. They provide a low cost way of purchasing and updating your software requirements throughout your organisation.

SYMANTEC. Microsoft COREL Lotus. Adobe

Microsoft OFFICE 2000 FAMILY

What Productivity Means Today

Microsoft Office offers four unique sets of productivity tools to meet your business needs. Whether you choose Office Premium, Professional, Small Business, or Standard, you get everything you need to help you work more efficiently every day.

Office 2000 enables you to:

- Easily share information and work with others. Microsoft Office 2000 applications support HTML, so you can easily share your work with others, regardless of the software they use.
- Manage your day efficiently. Send and receive e-mail, coordinate schedules, and track activities with your contacts using the personal information management features in the Microsoft Outlook messaging and collaboration client.
- Make better business decisions. Use easy drag-and-drop tools to conduct rich, interactive analysis, and identify trends and opportunities graphically with Microsoft Excel PivotChart dynamic views.
- Streamline the way you work. Reduce down-time and improve reliability. Self-repairing applications search for missing or corrupted files, and repair them automatically so you don't have to.

Microsoft	Premium	Professional	Small Business	Standard
Microsoft Word 2000	✔	✔	✔	✔
Microsoft Excel 2000	✔	✔	✔	✔
Microsoft Outlook	✔	✔	✔	✔
Microsoft Publisher	✔	✔	✔	
Microsoft Small Business Tools	✔	✔	✔	
Microsoft Access	✔	✔		
Microsoft PowerPoint	✔	✔		✔
Microsoft Frontpage	✔			
Microsoft PhotoDraw	✔			

OFFICE PACKAGES

Microsoft Office 2000 Professional

Upgrade MSS229 **ONLY $455**

Office 2000 Pro MSS214 **$865**

$50 CASH BACK*

* Pay $505 for Office Pro Ugrade & receive $50 Cashback.

WebSearch Code: MSS229
WebSearch Code: MSS214

* Offer valid until 15 October 1999. Offer only applies to Microsoft Office 2000 Professional Upgrade. Offer does not apply to Office Professional Open Licenses. Offer limited to one re-imbursement per customer. Cheque will be posted 2-4 weeks from receipt of Proof of Purchase

Microsoft Office 2000 Standard

Includes:
- Word 2000
- Excel 2000
- Outlook 2000
- PowerPoint 2000

Upgrade MSS220 **$390**

MSS217 **$719**

WebSearch Code: MSS220
WebSearch Code: MSS217

Microsoft Office 2000 Small Business

Includes:
- Word 2000
- Excel 2000
- Outlook 2000
- Publisher 2000
- Small Business Tools

Upgrade MSS223 **$395**

MSS216 **$719**

WebSearch Code: MSS223
WebSearch Code: MSS216

Microsoft Office 2000 Premium

Includes:
- Word 2000
- Excel 2000
- Outlook 2000
- Publisher 2000
- Small Business Tools
- Access 2000
- Powerpoint 2000
- Frontpage 2000
- PhotoDraw 2000

Upgrade MSS221 **$595**

MSS215 **$1159**

WebSearch Code: MSS221
WebSearch Code: MSS215

Microsoft Office 2000 Developer

Includes everything from Office 2000 Premium, plus all of the developer tools that you need to create custom solutions quickly and easily.

Upgrade MSS222 **$865**

MSS218 **$1479**

WebSearch Code: MSS222
WebSearch Code: MSS218

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QuickBooks V6

QuickBooks is the easy to learn and use, flexible, comprehensive and integrated accounting and financial management software package for small to medium size enterprises.

Increased efficiency
- Pop-up date calendar on date-fields.
- Sorts registers in 5 different ways
- 32-bit optimised performance, including right mouse-click functionality.
- Improved help file.
- Directly specifies the next cheque numbers when paying bills without having to return to the register.

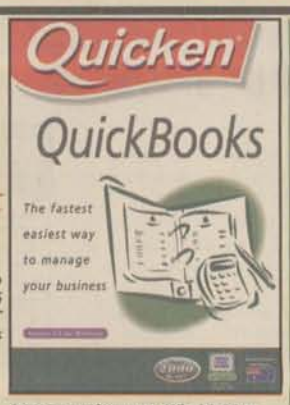
Easier to Work with Your Accountant
- Creates tax reports to assist in completion of the tax return. The reports show the amounts to fill in for each tax line on the tax return.

Increased Report Functionality
- Retains report orientation and remembers this next time you want to print it out.
- Unbilled costs by job. Allows users to quickly see any outstanding expenses not yet charged back to customers.

Customising Company Information
- Records the ACN or ARBN in a specific field so it appears on sales and purchase orders and reports.

FREE GST UPGRADE* FOR QUICKBOOKS V6

** Conditions apply. Offer valid to product purchased from V6 Launch date till release of GST ready version. Call for full details*



System requirements: Win 95, 98 or NT Platforms

QUI150
$175

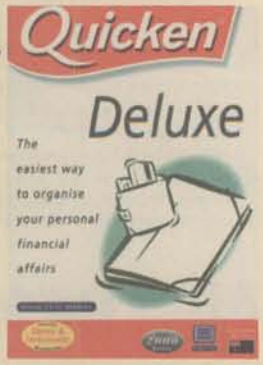
QuickBooks Pro V6 also features:
- Advanced job costing and budgeting
- 90 reports and graphs
- Estimates for better quoting
- Time-tracking / on-screen timer
- Multi-user enabled (option for additional licences)

QUI148
$309

WebSearch Code: QUI150
WebSearch Code: QUI148

Quicken 7 Deluxe

With Quicken, organising your personal and small business finances has never been faster, more simple, or more accurate. Quicken puts and keeps you in control. Track all bank accounts, credit cards, loans, mortgages and investments. And with "Move Transactions" you can put your money where you want it, when you want it. Fast. What's more, Quicken is easier to learn, and even easier to use. All of which adds up to a clearer insight, leading to you making well informed and better business decisions.



QUI141
$89

WebSearch Code: QUI141

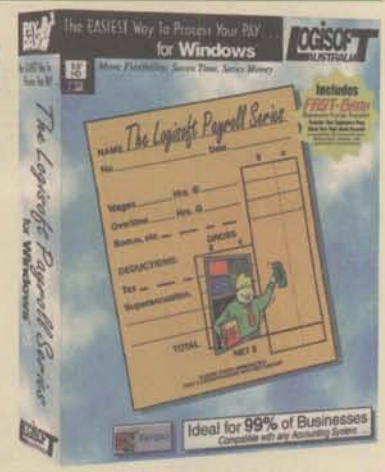
Payroll Headaches? You Need Logisoft!

NEW VERSION

It's time to make payday less stressful. With the Logisoft Payroll Series, you can process pay easier and faster, saving you time, money and sanity!

Since 1986, the ATO approved Logisoft Payroll Series has been developed to ensure compliance with all current Superannuation Guarantee and many other Award, Industrial and Legislative requirements. The Logisoft Payroll Series can back up it's claims: It is now being used to pay over 1 MILLION Australian employees EVERY WEEK! The customisable payroll series fully integrates with MYOB, QuickBooks, Pastel, Peachtree and many others. And it covers UNLIMITED employees! If you need more information, call our sales team on 1300 300 003.

Additional Features
- Includes FAST-BANK Electronic Funds Transfer - Transfer your employee's pays direct into their bank accounts. Compatible with Commonwealth Bank, National Bank, Westpac, ANZ and most other financial institutions.
- Start at any time throughout the financial year.
- Fully caters for Australian Award Requirements.
- Superannuation guarantee is easy to maintain.
- Submit ATO Group Certificates electronically.
- Includes FBT Support.
- Password security.
- Compatible with most Accounting systems.
- Designed and Produced ENTIRELY in Australia.
- Exports to MYOB, Pastel, Peachtree, QuickBooks, BIZZ WIZZ and to many other well known accounting programs.
- Reports can be E-mailed, previewed before printing, and exported for use in many different spreadsheet and word processing programs including, Word, Excel, WordPerfect, Lotus 1-2-3 and many others. Also exports to ASCII files and other formats for use in many other well known programs.
- Ideal for most payroll requirements.
- GST Ready.
- Y2K Compliant.
- More Flexibility, Saves Time, Saves Money.



Paybook (Single Company) LGS004
$199

PayPacket (up to 3 Companies) LGS005
$399

PayPacket Professional (Unlimited Companies) LGS006
$989

WebSearch Code: LGS004
WebSearch Code: LGS006
WebSearch Code: LGS005

FBT INCLUDED

QUI147	QuickBooks V6 Tech Upgrade	$89
QUI149	QuickBooks Pro V6 Tech Upgrade	$149
QUI151	QuickBooks Pro V6 - 5 Licences	$899
QUI152	QuickBooks V6 & Payroll	$449
QUI153	QuickBooks Pro V6 & Payroll	$549
QUI158	QuickBooks Pro V6 & Payroll - 5 User	$1249
QUI140	Quicken V7	$75
QUI142	Quicken for Business V7	$135
QUI155	Quick Payroll 6.0	$132
QUI156	Quick Payroll Pro 6.0	$269
MYO033	MYOB Digi-till	$999
MYO011	MYOB with Payroll (Mac)	$555
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MYOB Premier V2

Multi-user accounting that's as easy as MYOB

All the accounting features of MYOB Accounting with Payroll, plus additional features tuned for use across a network by multiple users. MYOB Premier brings the power, flexibility and award-winning ease-of-use of MYOB to multiple concurrent users. Includes access for 3 concurrent users – additional licences easily added.

What's new in V2

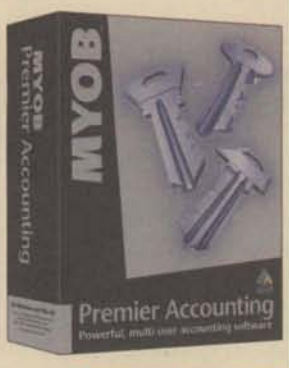
Professional Time Billing

Inclusion of a heavy-duty professional time billing module. MYOB is just right for professionals such as consultants, lawyers, accountants, architects, graphic designers and anyone who bills by the time they spend with a client or on a project.

Enhanced Inventory

Now more powerful than ever with breakthrough features including:

- Multiple pricing levels - for a single product easily set prices for retail, wholesale or any of 5 levels
- 5 years of item sales history
- New user-definable fields - keep track of colours, styles or anything else you wish



WebSearch Code: MYO013

MYO013
$869

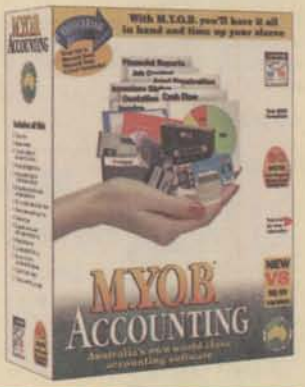
MYOB Accounting V8 & MYOB Accounting With Payroll V8

MYOB Accounting Version 8 builds on all of MYOB's award-winning features and adds:

- MYOB OfficeLink direct link to MS Word and MS Excel
- User-definable aging – choose 7-14-21 days or whatever you want. Plus correct monthly aging
- Electronic payments via your bank & 27 other enhancements

Features include: General Ledger, Chequebook, Sales & Receivables, Purchases & Payables and Full Inventory.

MYOB Accounting with Payroll includes all of these features plus a fully integrated Payroll.



WebSearch Code: MYO030
WebSearch Code: MYO031

MYOB Accounting V8
MYO030
$325

MYOB Accounting V8 with payroll
MYO031
$475

MYOB AssetManager

Do you know how much money you have invested in fixed assets? Do you know where they are? Can you quickly provide a list of assets to the insurance company? Are you keeping depreciation schedules and asset cost information the ATO requires? With MYOB AssetManager, a revolution in the management of fixed assets, you can now answer these questions and more - easily & cost effectively!

WebSearch Code: MYO003 **Y2K compliant**

MYO003
$249

MYOB FirstAccounts

Your ideal first accounting system, MYOB FirstAccounts makes it easy for you to track income and expenditure, reconcile bank statements, create and print invoices, statements, and purchase orders, track who owes you money and who you owe money to. Produce profit & loss and other key reports with a mouse click.

No business is too small for FirstAccounts. Outgrown Quicken, MSMoney? You can easily move up to MYOB FirstAccounts. FirstAccounts is designed for small service businesses and includes all the features you need today, and a growth path for the future. If, as your business grows, you want more power, flexibility and analysis you can easily upgrade to MYOB Accounting. No rekeying of data is required. You can upgrade without stopping business.

Made in Australia, for Australian Businesses

Accounting and business requirements differ greatly between countries. That's why FirstAccounts has been created in Australia, for Australian businesses. No one else provides world-class software written specifically for Australian businesses.

WebSearch Code: MYO025

MYOB FirstAccounts
MYO025
$165

MYOB PowerPay

As your business or organisation grows, managing your payroll becomes very complex, very quickly. PowerPay takes the stress out of payday, by processing even the most complex payroll in minutes.

Designed for companies with more than 20 employees, Powerpay is quick and easy to set up. Using a prompting system, it guides you through setting up the details for each employee. It even comes with 60 days free introductory support.

WebSearch Code: MYO028 **Y2K compliant**

MYO028
$425

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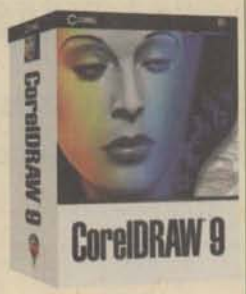
COREL CorelDRAW 9 Graphics Suite

The world's number one PC illustration and image-editing program for professionals



Major Applications:
CorelDRAW 9 - illustration and page layout
Corel PHOTO-PAINT 9 - image editing and bitmap creation

Suite-Wide Features
- Robust PDF support, including import and export, job ticketing, bookmarks, image downsampling and more
- Enhanced printing features - imposition layout, preflight warnings, miniature preview to verify changes and downsampling of bitmaps
- Import and export images with embedded ICC standard profiles - CPT, CDR, TIFF and EPS
- Interactive tools, including Perspective Drop Shadow, Fill, Blend, Transparency and more
- ixla digital camera interface for easy download of images from over 120 camera models
- Support for Adobe Illustrator AI, EPS and Adobe Photoshop PSD with layers, and MetaCreations Painter RIFF files

Libraries
25,000 professional clipart
1,000 TrueType and Type 1 fonts
2,500 high-resolution photos

WebSearch Code: COR271

EDUCATIONAL pricing AVAILABLE

CorelDRAW 9 Upgrade
COR271
$405

COREL CorelDRAW Select Edition

This exceptional graphics suite gives you the tools you need for breathtaking results. Take advantage of CorelDRAW 7 and Corel PHOTO-PAINT 7 for graphic design, photo editing, special effects, illustration and page layout. Plus, a host of utilities makes the design process much more intuitive.

Features
- Get help when you need it with CorelTUTOR and context-sensitive hints
- Work intuitively with a Property Bar that changes to suit the task at hand
- Access commonly used tools quickly with the fully customisable, streamlined user interface
- Enhanced special effects include bevelled extrusion, accelerated blending and colour adjustment of vector illustrations
- Publish to the Web easily with Internet graphics support, including Web browser colour palettes, image map creation tools, HTML, Corel Barista, animated and transparent GIF and Progressive JPEG
- Customise bitmaps with comprehensive effects and support for industry-standard bitmap plug-ins
- Click and drag to apply transparencies, fountain fills and blends to objects

Core Applications
- CorelDRAW 7
- Corel PHOTO-PAINT 7

Supporting Utilities
- Kodak Digital Science
- Colour Management System
- Corel OCR-TRACE
- CorelSCAN
- Corel MULTIMEDIA MANAGER

Plus ...
- 50 clipart images
- 50 TrueType and Type 1 fonts
- Spellchecker
- Thesaurus

WebSearch Code: COR542

COR542
$79

30 DAYS FREE TIME TRIAL CD!*
CoreDRAW 9 • Word Perfect Office 2000 • Print House Magic 4 • VENTURA 8 *Normal Carriage Applies

Corel Gallery Magic 1,000,000

One Million is an easy-to-use, collection of clipart images, photos, fonts, sounds, and web images at a great price

Add excitement to any project with Corel GALLERY Magic 1,000,000. Corel GALLERY 1,000,000 is a collection of clipart, professional photos, Web images, animations, sounds, videos, and fonts. Corel GALLERY 1,000,000 lets you add items into documents or files that have been created using a variety of software applications, such as word processors, presentation applications, and Web page editing applications.

Find images with the new browser/search engine and alter them with powerful photo-editing tools. With over one million images* to choose from, this collection is ideal for almost any project.

Includes:
- 800,000 Web images*
- 140,000 vector clipart Images*
- 60,000 photos
- 1,000+ fonts
- 530+ sounds
- 125 videos
- **Plus... Corel Photo House 2.1** Touch up, alter or enhance your Corel GALLERY™ 1,000,000 digital images

* Note: Includes over 825,000 images new to this product plus over 175,000 images from Corel GALLERY Magic 200,000.

WebSearch Code: COR541

EDUCATIONAL pricing AVAILABLE

COR541
$129

Corel Print House Magic 4 Premium

Corel Print House Magic 4 Premium offers simple and creative solutions for home publishing and photo editing. Design projects for print or e-mail, including greeting cards, invitations and more, with customizable samples. Plus, follow step-by-step guides and use over 80,000 images to personalize material. It's easy to get started and the possibilities are endless.

What's new?
- More projects, including party theme sets and games
- More photo-editing effects, featuring Custom Warp and object transparencies
- Convenient search engine and flyout catalog to find images fast
- Arrange to Background feature for easy template creation
- Improved work area - everything's at your fingertips!
- Improved Internet capabilities for easy e-mailing and Web publishing

WebSearch Code: COR544

Corel Print House Premium
COR544
$79

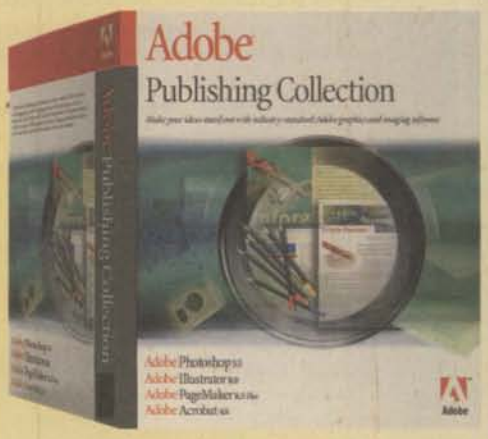
COR270	CorelDRAW V9	$749
COR561	CorelDRAW V9 Educational	$209
COR540	Corel Print Office	$139
ADO206	Adobe PageMaker 6.5 Plus (Win)	$769
ADO207	Adobe PageMaker 6.5 Plus (Mac)	$769
ADO160	Adobe Illustrator 8 (Win)	$699
ADO161	Adobe Illustrator 8 (Mac)	$699
ADO186	Adobe GoLive 4.0 (Win)	$525
ADO037	Adobe GoLive 4.0 (Mac)	$525
COM105	Blade Pro	$69
COM106	Illuminatus 4.5	$249
JAS009	Paintshop Pro 5.01	$135
MSS197	MS PhotoDRAW 2000	$229
MSS247	MS Publisher 2000	$149
MSS246	MS Publisher 2000 Upgrade	$119
MSS177	MS Picture It! 99	$75

Adobe Publishing Collection

Adobe

The complete package for the creation, assembly and delivery of printed & electronic documents

NEW VERSION



If you have to choose one box - Choose This One!

The Adobe Publishing Collection for Windows and Mac brings together the latest versions of four of the World's leading graphic software packages all in one box. But not only do they come as one - they work as one.

Drag and drop features lets users move effortlessly between programs, ensuring a seamless workflow - whether for print, multimedia or online. The Adobe Publishing Collection comes at a fraction of the price of buying Adobe software separately and we're sure you will agree that choosing the Adobe Publishing Collection is a 'No Contest' decision. A comprehensive and cost-effective way for users such as graphic artists to business professionals to start publishing. Included in the one box are the following Adobe packages:

- **Adobe PageMaker 6.5 Plus**
- **Adobe Illustrator 8.0**
- **Adobe Photoshop 5.5**
- **Adobe Acrobat 4.0**

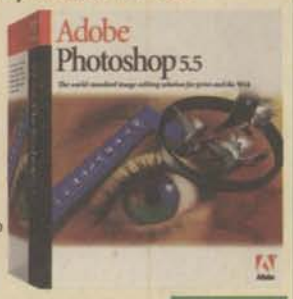
WebSearch Code: ADO204
WebSearch Code: ADO205

Windows ADO204	Mac ADO205
$1779	**$1779**

GRAPHICS

Adobe Photoshop 5.5

The world-standard image-editing solution for print and the Web



Adobe Photoshop 5.5 soft-ware offers new creative tools and Web features and gives you the power of Adobe ImageReady 2.0 for advanced processing of Web graphics.

Transform images with "painted" brush strokes, and perform complex masking tasks with professional-level precision.

Complete all your essential Web functions including file optimisation right in Photoshop, and then jump to the ImageReady application to slice layered images, produce JavaScript rollovers, and create GIF animations.

Create original artwork, retouch photos, and add special effects with comprehensive filters.

This integrated tool set maximises your productivity while helping you achieve the finest quality output.

EDUCATIONAL pricing AVAILABLE

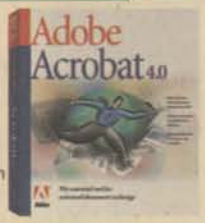
WebSearch Code: ADO192
WebSearch Code: ADO193

Windows ADO192	Mac ADO193
$1059	**$1059**

Adobe Acrobat 4

The Essential Tool for Universal Document Exchange

"It's like you deliver the document yourself"



When you're sending a electronic document, you want it to arrive exactly the way you intended. With Acrobat 4.0 from Adobe you can be sure that it will. Adobe Acrobat 4.0 works with almost any platform or application. It's not just smart, it's easy.

Adobe Acrobat 4.0 offers:

- Flexibility - Acrobat lets you exchange documents freely, without worrying about compatibility issues.
- Productivity - Quickly creating and delivering PDF files that everyone can view, distributing them electronically for comments and approvals, and efficiently publishing them in any medium replaces an often cumbersome, time-consuming, paper-based workflow.
- Control - PDF lets you share documents without sacrificing their original design. PDF preserves the documents' formatting, colors, fonts, and images exactly as they were created.
- Accessibility - PDF files can be distributed in print, on the Web, on corporate servers, attached to e-mail, or on CD-ROM.

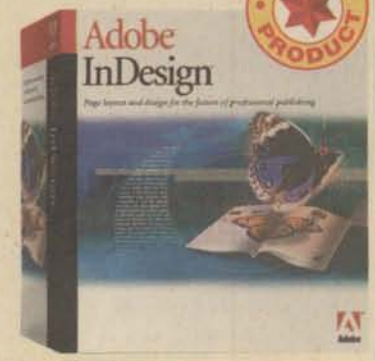
WebSearch Code: ADO178
WebSearch Code: ADO177

Windows ADO178	MAC ADO177
$399	**$399**

Adobe InDesign

NEW PRODUCT

Page Layout and Design for the future of professional publishing



Adobe InDesign software is a new, state-of-the-art page layout program that delivers unprecedented creative freedom, productivity, and precision, while integrating seamlessly with Adobe's other leading design programs.

Award-winning Adobe user interface – Enjoy design tools that work together to provide a seamless creative environment. InDesign, Illustrator, and Photoshop software looks, feels, and behaves similarly because of common tools, commands, palettes, and keyboard shortcuts.

Windows ADO181	Mac ADO208
$1199	

WebSearch Code: ADO181
WebSearch Code: ADO208

* *Available to registered users of Quark Xpress, Adobe Photoshop, Adobe Illustrator and Adobe PageMaker*

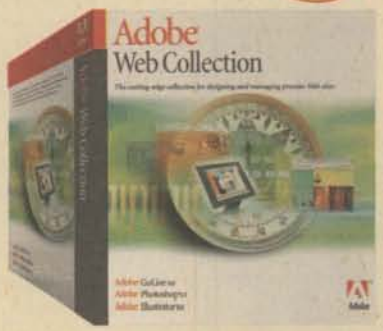
Windows ADO211	Mac ADO212
COMPETITIVE UPGRADE* LIMITED TIME ONLY	
$495	

Adobe Web Collection

NEW PRODUCT

The cutting-edge collection for designing and managing premier Web sites.

The Adobe Web Collection is a comprehensive software suite that gives you the power to design extraordinary still and interactive Web graphics, optimize those graphics for efficient downloading, and build dynamic Web sites that support the latest technology and standards. The collection includes three award-winning Adobe applications: Adobe GoLive 4.0, Adobe Photoshop 5.5, and Adobe Illustrator 8.0.



WebSearch Code: ADO209
WebSearch Code: ADO210

Windows ADO209	Mac ADO210
$1835	**$1835**

EXPRESS ORDERLINE 1300 300 003

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offer ends 30 September 1999

Smart enough to buy any of these titles: then you deserve to be rewarded! Simply visit our on-line quiz site and you can earn smart cash. Redeem your Smart Cash for on-line prizes. (Prizes not redeemable for cash!)

Now here's a tip: If you are really smart; you will take the time to take a good look at our web-site; just to make sure you are prepared for the quick IMSI Quiz...the more you know about us the more dollars you will earn ... the winning is simple if you know your stuff.

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GET SMART: GET CONNECTED – www.imsi.com.au

MasterClips 1,250,000

IMSI

NEW PRODUCT

We've combined the vast and complete MasterClips Premium Collection on CD with ArtToday's expanding online image archive. The result: 1,250,000 - a new standard in clip art quality, convenience and selection. And with the included vector art editor, hundreds of thousands of image options are only the beginning! Online or right out of the box, awesome images from two of the art industry's favourite collections make your every project, presentation, publication, or Web page as stylistically unique as can be!

Featuring:

- 500,000 Images on CD
- 750,000 Images on Line
- Key Word Searches
- Vector Art Editor

WebSearch Code: IMS256

IMS256
$199

Masterclips 3D Artist

IMSI

NEW PRODUCT

Create 3D clip art in seconds using ready made 3D models. Simply choose a model, then resize, rotate, add light or shadow and apply your own style such as cartoon, water colour or even charcoal! It couldn't be easier!

Masterclips 3D Artist comes with 500 3D models included. Choose from many more via the internet once you have registered the product.

Whether you want to produce a birthday card for a friend, or add that leading edge to a business presentation. From beginner to graphic expert, Masterclips 3D Artist will make you stand up and stand out!

- 500 3D models
- Many more online (registration required)
- One click texture and lighting options
- Integrates with Microsoft Word, Excel and Powerpoint plus many graphics/DTP packages

WebSearch Code: IMS257

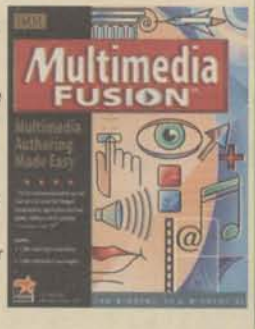
IMS257
$69

Multimedia FUSION

IMSI

Multimedia Authoring Made Easy!

Multimedia Fusion is an efficient alternative to script-heavy authoring software. It is the first tool that lets you create professional-quality interactive applications without having to write a single line of code. Multimedia Fusion's object-oriented development structure lets everyone from engineers to experienced developers author interactive media for business, school or the Internet, in a fraction of the time! Whether you're an interface designer, marketing professional, Webmaster or student, Multimedia Fusion's accelerated approach to sophisticated multimedia design is perfect for every need.



- full screen multidirectional scrolling
- drag & drop development
- 1200+ sound effects
- 300+ music wave 60+ midi files
- 5000+ background animated objects & animated characters

WebSearch Code: IMS133

IMS133
$179

TurboCAD V6

IMSI

Improve how you design, draw and visualise your projects

New Version 6 goes way beyond making the normal feature improvements and introduces even more tools and incredibly powerful technology getting to the core of professional quality rendering. TurboCAD V6 is CAD for the Internet Age!

Now that it has its own Integrated Internet Palette, TurboCAD V6 connects you to the World Wide Web and a wealth of useful resources available online. Using your integrated browser, you can actually share desktop space and browse www.turboCAD.com and other Web sites as you work within the application.

TurboCAD V6 is feature rich and powerful! Don't Compromise your power to impress.

Use Continuous Speech Recognition Technology to free your hands while you work by simply using voice activated commands.

Version 6 also includes a Software Developer Kit; Advanced Raster-to-Vector; Familiar Interface Option for Microstation and AutoCAD; Lightscape Technology and much, much more.....

WebSearch Code: IMS146

IMS146
$199

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TERMS & CONDITIONS

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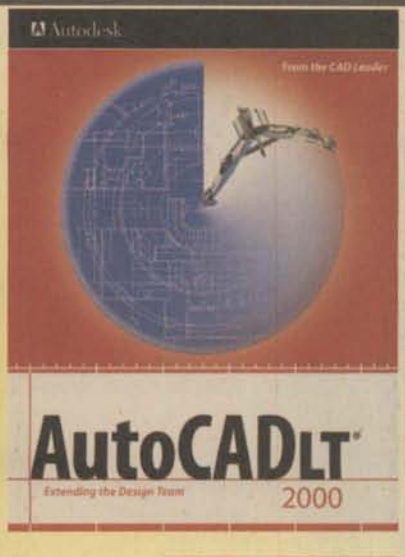
AutoCAD LT 2000

The easy, efficient way to extend your design team
The only low cost, professional 2D CAD program that's 100% AutoCAD compatible



New AutoCAD LT 2000 is the easiest, most efficient way for you to extend your design team-because it's simple enough for new-to-CAD users, accessible enough for occasional users, and powerful enough for professional-strength drafting. Plus it's the only low-cost, professional 2D CAD program to combine productivity-packed precision and award-winning HTML-based online help with unprecedented ease-of-use and 100 percent AutoCAD 2000 compatibility. So team members can exchange drawing files with confidence knowing that data integrity and visual fidelity are ensured. And they can take advantage of more than 200 new productivity features including Multiple Design Environment, AutoCAD DesignCenter, and the Object Property Manager.

AutoCAD LTÆ 2000 is the perfect low-cost, 2D CAD tool for today's design environment. That's because there's usually an extended design team working on every project. From the architects and engineers to the drafters, consultants, and clients your entire team will communicate more easily, share data more accurately, and work more efficiently thanks to all of the professional-strength features of new AutoCAD LT 2000.

- Visual and Intuitive
- Drawing Productivity
- Compatibility and Design Sharing
- Learnability

WebSearch Code: AUT469

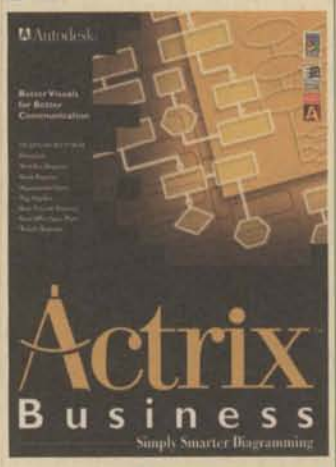
AUT469
$849

GRAPHICS

Actrix Business

Better Visuals for Better Communication

Actrix Business is the easy-to-use, value-priced diagramming tool designed for business professionals who need to quickly create dynamic visuals like flowcharts, block diagrams, organization charts, and other business drawings. Get results faster with features like single-click drag-and-drop drawing, automatic snapping and alignment of shapes, and easy navigation using the familiar Microsoft Office interface. Get your point across faster with compelling visuals that can be easily dropped into Microsoft Word or Powerpoint documents, or shared on the Internet in HTML. Actrix Business is part of the Actrix family of Simply Smarter Diagramming tools from Autodesk, the world leader in PC-based design tools.



AUT470
$179

WebSearch Code: AUT470

Actrix Technical

The Simply Smarter way to diagram

Actrix Technical is a 2D diagramming tool that provides a truly automated drawing environment for easily creating a full range of dynamic drawings, from facilities plans to technical schematics to business diagrams.

Easy to Use

Just select the template that suits your task and browse the catalogues you're shown. Then drag and drop the ActiveShapes objects you need into your diagram or drawing. You can even directly manipulate them on-screen.

Superior AutoCAD Interoperability

Actrix Technical can read and write AutoCAD drawings, and it lets you reuse AutoCAD blocks in your diagrams.

Intelligent, Discipline-Specific, ActiveShapes

Drag intelligent ActiveShapes into place and they automatically snap, align, and rotate precisely into position. Handle-based, dynamic editing means you can reshape them on the fly. Thousands of ActiveShapes objects have been developed by industry experts and are included with Actrix Technical software.

WebSearch Code: AUT056

AUT056
$499

AutoSketch 6.0

Spend Time Drawing - Not Learning Software!

An affordable and easy-to-use precision drawing tool for new or occasional CAD users who need to create conceptual drawings and sketches. AutoSketch 6.0 provides productivity and ease of use features not found in other low cost precision drawing programs. Other features include 3-D Effects to add more impact to conceptual drawings, proposals and presentations; customisable grids; in-place OLE editing and the ability to import/export DWG files. Compatible with Microsoft Windows 98, 95 and NT.

- Drawing Guides
- Automatic Snap
- Spell Check
- Dynamic Pan & Zoom
- AutoArray
- Detail View
- Construction Lines
- Advanced tools for easier wall placement
- Hyperlinks

QUI052
$169

WebSearch Code: QUI052

QuickCAD

Faster, easier, and most affordable CAD!

QuickCAD Millennium Edition is the faster, easier, most affordable CAD software, whether you're a first-time user or an expert. A three-level interface prompts you to choose your level of experience - Beginner, Advanced, or Expert - to easily create any technical drawing. Other features include QuickHatch, AutoArray, Jump Snap, Guidelines, Realtime Pan and Zoom and compatibility with most popular CAD programs. In addition, QuickCAD software's DWF export allows you to publish your drawings on the Web. QuickCAD Millennium Edition offers features and performance to allow you to become more productive even faster.

WebSearch Code: AUT040

AUT040
$75

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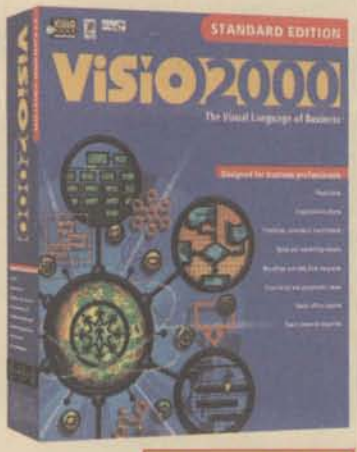
Visio Standard 2000

The Worldwide standard for creating & sharing business diagrams

NEW VERSION

Visio 2000 Standard Edition takes the worldwide standard in business diagramming tools to the next level. Using Visio 2000's seamless Microsoft integration, you can drag and drop flowcharts, organization charts and other business diagrams into PowerPoint, Excel and Word documents. Add brilliant new backgrounds, borders and color schemes, then leverage Visio 2000 Standard Edition's advanced Internet functionality to create, store and exchange drawings via your corporate intranet or the Web.



Features:
- Easy to Learn & Use
- Streamlined Work Environment
- Enterprise-wide Diagramming
- Microsoft Office Compatibility
- Rich Internet Support

Visio 2000 Standard
VIS120
$329

WebSearch Code: VIS120

Visio Standard 5.0

The smartest way to create all your business diagrams

Visio Standard is designed to help increase the productivity of mainstream business users by allowing them to easily communicate and track work projects and flow, reporting structures, and concepts or systems. Visio Standard allows business users to visualise information commonly stored and distributed in databases and spreadsheets, thus avoiding complex and time consuming analysis of data and figures.

- Visualise information stored and distributed in databases and spreadsheets.
- Avoid complex and time-consuming analysis of data and figures.
- Easily build and share your business diagrams with Microsoft Compatibility.
- Drag and drop your diagrams into any OLE compliant word processor, presentation package, spreadsheet or other software.
- Built-in support for Internet/Intranet standards (HTML and ActiveX) and document management standards ODMA).

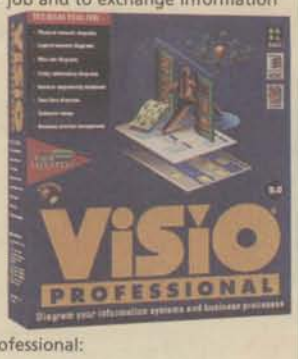
Visio 5.0 Standard
VIS099
$315

WebSearch Code: VIS099

Visio Professional 5.0

Cross-Functional Uses for IS/IT Professionals

Whether your IS/IT specialty is networks, databases, or software, Visio Professional gives you the tools to do your job and to exchange information effectively with other IS/IT personnel.



- Network diagramming and documentation.
- Software diagramming and documentation.
- Database diagramming and documentation.
- Share and exchange information.

A Fully Customizable Development Platform

Different jobs require different capabilities. That's why we allow you to customise virtually every aspect of Visio Professional:

- Create custom shapes
- Integrate Visio Professional into a custom solution
- Add ActiveX controls
- Tap our developer resources

Did you know that we make two products for the IS/IT professional? If you need a more powerful design and modelling tool, check out Visio Enterprise, built on the foundation of Visio Professional.

Visio Professional 5.0
VIS106
$599

WebSearch Code: VIS106

Technical 5.0

VISIO TECHNICAL

Create & share technical drawings

Visio Technical is the fastest, most versatile 2-D technical diagramming tool available.

1. **Fast** - Its drag-and-drop drawing style and intuitive work environment enables users to quickly produce high-quality technical diagrams with little or no training.
2. **Intelligent** - Every SmartShapes symbol can store a unique set of data and is programmed to behave like its real-world counterpart.
3. **Compatible** - With built-in CAD integration you can read and write files in popular CAD formats, and even convert static CAD symbols into dynamic Visio Technical shapes.

Simply choose from the included library of more than 4,000 expert designed, industry-specific symbols, then drag and drop the shapes you need onto the drawing page to assemble technical diagrams in record time.

With Visio Technical, you can even post drawings on intranet or Internet sites; and customise solutions using the built-in Microsoft Visual Basic for Applications programming tool.

Visio Technical 5.0
VIS107
$599

WebSearch Code: VIS107

VIS121	Visio Standard 2000 Upgrade	$169
VIS123	Visio Standard 2000 10-User Licence Upgrade	$1389
VIS124	Visio Standard 2000 10-User Licence	$2699
VIS100	Visio Standard 5.0 Upgrade	$159
VIS101	Visio Standard 5.0 10-User Licence	$2599
VIS104	Visio Professional 5.0 Upgrade	$315
VIS098	Visio Professional 5.0 1-User Licence	$569
VIS105	Visio Professional 5.0 10-User Licence	$5279
VIS102	Visio Technical 5.0 Upgrade	$325
VIS103	Visio Technical 5.0 10-User Licence	$5339
VIS111	Visio IntelliCAD 98	$595
VIS118	Visio IntelliCAD 98 Upgrade	$259
VIS116	Visio Enterprise 5.0 Upgrade	$1099
MAT135	MathCAD 8.0 Standard	$309
MGF026	Micrografx iGrafx Business	$359
MAC127	Macromedia Fireworks 2 (Mac)	$349

Web Design Studio

macromedia

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A complete integrated solution for professional Web designers

Macromedia's Web Design Studio offer provides Web designers and developers with the premier package of tools for creating the basic building blocks of interactive web sites: graphics, vector animation & sound, and code. With Dreamweaver, Fireworks, and Flash, you can visually create interactive Web sites that load fast and work great across different computer platforms and web browsers.

Web Design Studio includes everything you need to design and produce professional web sites.

- Dreamweaver is the solution for professional Web site design and production. It is the only tool to offer Roundtrip HTML between visual and source editing. Dreamweaver 2 takes productivity to a higher level with advanced table editing, deluxe site management tools, Dream Templates, and extensibility beyond your wildest dreams.
- Fireworks can be used to create feature graphics, buttons, animated banners and JavaScript rollovers to be included in a Dreamweaver HTML document. Optimize and slice your graphics before flowing them seamlessly into Dreamweaver.
- Flash is the standard for interactive vector graphics and animation for the Web. Web designers use Flash to create beautiful, resizable, and extremely compact navigation interfaces, technical illustrations, long-form animations, and other dazzling effects for their site. Graphics and animation will anti-alias and scale based on the viewer's screen size, providing high-quality viewing.

Includes:

* *Macromedia Dreamweaver 2* * *Macromedia Fireworks 2* * *Macromedia Flash 4*

WebSearch Code: MAC090

MAC090 **$919**

GRAPHICS

Dreamweaver 2

The Solution for Professional Web Site Design and Production

Quickly design Web sites while maintaining control over source HTML with Roundtrip HTML. Boost productivity with templates, site-wide editing and compatibility with your favorite design, database and e-commerce tools.

WebSearch Code: MAC117
WebSearch Code: MAC114

MAC114 **$489** | Upgrade MAC117 **$249**

Fireworks 2

Professional Web Graphics Design and Production

With just one application, you can now design, optimise and integrate fully editable Web graphics, animations and comps.

- New! Breakthrough optimisation options produce smaller files!
- New! Automate your workflow across your site!
- New! Seamless integration with your favorite HTML editor!
- New! Complete set of time-saving design tools!

Upgrade MAC126 **$239** | MAC058 **$329**

WebSearch Code: MAC126
WebSearch Code: MAC058

Flash 4

Produce High-Impact, Vector-Based Web Sites

- Deliver high-impact Flash sites by mixing and Synchronising MP3 streaming audio with interactive buttons and animation.
- Create distinctive user interfaces, site navigation and other Web applications without programming.
- Produce animated designs more efficiently than before with the optimised Timeline, smart motion guides and outline color mode.

MAC120 **$525**

WebSearch Code: MAC120

Director 7 Shockwave Internet Studio

(including Fireworks 2)

Director unleashes your creativity with the only tools powerful enough to combine graphics, sounds, animation, text and video into compelling content that grabs your audience and delivers your message.

- Deliver applications and presentations quickly through easy-to-use visual metaphors
- Multiuser Server to build shared Web experiences and multi-player games

WebSearch Code: MAC112

MAC112 **$1719**

iGrafx DESIGNER

MICROGRAFX®

iGrafx Designer is the only complete toolset for technical and web graphics, with micron-accurate scale drawing and creative tools, and imaging graphics for publishing and the Web.

Features & Benefits

- Includes iGrafx Business.
- Comprehensive annotation - annotate files with associative dimension lines, angular and radial dimensions, area, volume and perimeter along with call outs.
- Transparent vector effects - make colours, gradients or bitmap and tiled fills transparent or gradually transparent.
- Output interactive iGrafx Designer files as interactive JAVA applets for use with any web browser.
- View, name and manage objects and layers with the object and layer browser.
- Line styles for any type of technical illustration or fashion design.

WebSearch Code: MGF027

MGF027 **$695**

iGrafx PROFESSIONAL

MICROGRAFX®

Create Professional-Quality Business Diagrams... Your Way!

To make an impact and get your point across you need to communicate ideas, information and data using clear, instantly understandable visuals that give you and your company an edge. Create flowcharts, process maps, network diagrams and organisation charts faster and easier than ever before.

Features & Benefits

- Automatic offpage connectors - makes multi-page printed diagrams easier to read. When published as HTML, connectors become hyperlinks.
- Web Links - All documents and web pages can be linked.
- Includes iGrafx Business.
- Multiple fonts, interline spacing, paragraphs and bullets within shapes - Create attractive, stylish charts that accurately reflect the information being communicated.
- Import diagrams created with Visio.

WebSearch Code: MGF025

MGF025 **$675**

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- International*

* where applicable

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All prices include Sales Tax. Prices subject to change, see page 46 for terms and conditions.

Office Advantage

The Professional Way to Communicate and a Premier Plug-In for Microsoft PowerPoint and Excel

Office Advantage helps you effectively comprehend and communicate information. It brings clarity to 2D and 3D Excel charts and automatically improves the fidelity, navigation and playback of PowerPoint presentations. The result is the professional way to communicate on screen, in print or on the Internet.

- Add a voice track and deliver the message even when you can't be there
- Connect your ideas with professional film transitions
- Distribute your presentations via email or the Web
- Create professional presentations in minutes!
- Highlight critical information with eye-catching 2D and 3D charts

MetaCreations

WebSearch Code: MET030

MET030 **$225**

Painter 6

MetaCreations

MetaCreations Painter 6 is the best version yet of the ultimate painting tool for graphic designers and fine artists alike. Painter's exclusive tool set offers an extensive array of brushes, textures, canvas choices, and art materials to faithfully capture the subtleties of an artist's style for high-quality output for print and the Web. The artist can now create their finest work using the next generation brush engine technology, with new features including text along a curve, layering of vector and bitmap images together, improved performance, better memory handling and an easier to use interface. Painter 6 – the world's indisputable leader for image creation.

WebSearch Code: MET038

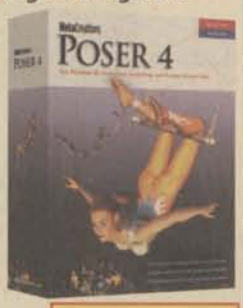
MET038 **$549**

Poser 4

MetaCreations

The Premier 3D Character Animation and Figure Design Tool

Animate a 3D actor to tell your story. Create an electronic comic book with dinosaurs, people or futuristic robots, all interacting on stage.



New Features Include:
- Improved human figures with added resolution
- New animal figures
- Swappable 3D clothes wardrobe
- Bendable props
- 2nd CD with extra textures, sounds, motion files, morphs, props, utilities and samples
- Includes bundled version of Painter 3D

WebSearch Code: MET035

MET035 **$409**

Bryce 4

Bryce 4 is dedicated to designing, rendering and animating breathtaking natural 3D worlds and abstract 3D sculptures.

- Textured terrain export through real-time multi-resolution Export Lab
- Interactive movie previewing system
- Create stunning skies with the tools available in the Sky Lab
- Use Bryce to build content for the Web, using a variety of authoring tools

MetaCreations

WebSearch Code: MET033
WebSearch Code: MET032

Bryce 4 U/G MET033 **$259**

MET032 **$485**

The Complete National Geographic

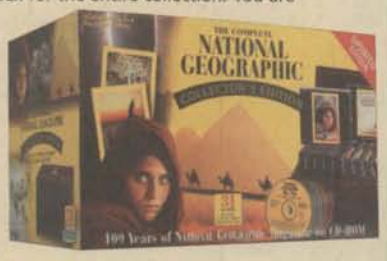
NATIONAL GEOGRAPHIC INTERACTIVE

108 Years of National Geographic on CD ROM

An indispensable resource for every home and school library, The Complete National Geographic includes all of National Geographic magazine's award-winning photographs, stories, maps* and charts, plus period advertising from the past century.

Finding specific articles, features or advertisements is easy with The Complete National Geographic's powerful search engine. You can quickly browse more than 175,000 pages of text and 1,200 magazine covers, locating specific articles by date, issue, topic, or title.

Each CD includes the search index for the entire collection. You are automatically pointed to the correct location of each article, feature or advertisement. It even references the printed issue, by month and page numbers!



Selected pages can be printed out, in colour or black-and-white, and articles can be bookmarked and returned to at a later date.

Features
- Unique historical archive on 30 CDs
- Entire search index on all CD
- 178 567 spectacular images
- 9048 fascinating articles
- 100 years of classic advertisements
- Over 175 000 pages of engaging text
- NATIONAL GEOGRAPHIC's integrity and quality in a new digital medium

SCHOLASTIC

WebSearch Code: SCH001

* *supplement maps not included*

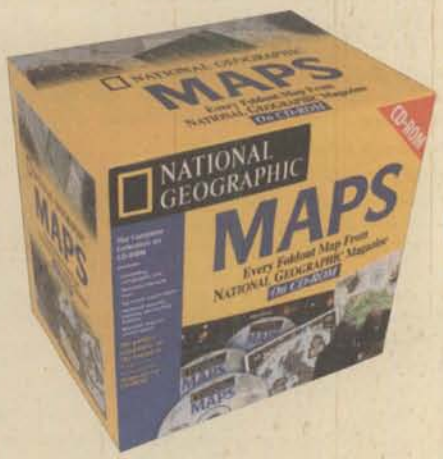
SCH001 **$259**

National Geographic Maps

NATIONAL GEOGRAPHIC INTERACTIVE

This unprecedented CD-ROM archive includes every fold-out map ever published by National Geographic magazine, plus engaging multimedia map tours, an interactive timeline that traces the evolution of mapping, key events in National Geographic cartography and the fascinating stories behind these very special maps.

- Contains maps developed for famous world leaders throughout the 20th century
- Search for maps by geographic location, theme, scale and more
- View, plan and zoom in on selected maps at diverse levels
- Print each spectacular full-scale map or map section in glorious colour
- Copy and paste maps into other documents



WebSearch Code: SCH005

SCH005 **$119**

OmniPage Pro Scanner Suite

Everything you need for your scanner

Includes

- Omnipage Pro 9
- PageKeeper Pro 3.0
- Adobe PhotoDeluxe Business Edition

Omnipage pro Scanner Suite gives you:

More Accurate OCR

- Over 99% accurate*
- Ability to maintain layout of original page
- Superior integration with Microsoft Word
- Improved OCR Proofreader
- Supports Windows 95,98 and NT 4.0
- Easy, on-click OCR
- Spreadsheet format recognition
- Ability to recognise tables as tables

Automatic File & Find

- Automatic document organisation with Smart Folder
- Automatic document importing with Folder Watch
- Faster, more advanced searches
- Supports any file type
- Easily manages Web pages

Better Image Editing

- Guided Activities for businesses such as real estate, travel and consulting
- Hundreds of business templates for Web banners, direct mail and more
- Ability to print to Avery paper for labels, business cards and more
- Direct access to Adobe Website for other products form the Adobe Family

** On laser quality documents using standard fonts*

† Information provided by Performance Sales.

Also Includes:

Post-it Software Notes

The Top Annotation Software

Now have the convenience of Post-it Notes on your PC. Post-it Software Notes are a quick, easy way to organise and communicate ideas without interrupting your work. Just click the Post-it Note Pad and start typing!

With Post-it Software Notes, your ideas are easily stored, found, printed, embedded in a document and more. You can add notes to scanned images, other documents, and even put them on the desktop.

Upgrade OMN117 **$279**

OMN118 Omnipage Pro Scanner Suite **$1099**

WebSearch Code: OMN117

GRAPHICS

PageKeeper Pro 3.0

The Best Document Manager

NEW PRODUCT

PageKeeper Pro 3.0 is the only document manager to fully automate the time-consuming tasks of organizing and maintaining all your documents. Need a document fast? PageKeeper Pro works like a search engine and instantly finds all documents that meet your criteria.

- Automatically files documents with Smart Folders
- Automatically keeps track of edits
- Instantly finds any document
- Supports any file format
- Manages Web pages

OMN116 **$99**

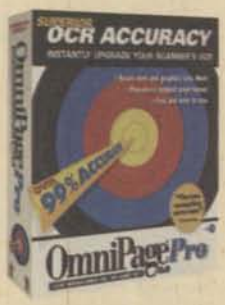
WebSearch Code: OMN116

OmniPage Pro 9.0 Upgrade

Superior OCR Accuracy

OmniPage Pro 9.0 is the world's leading OCR software with superior OCR accuracy. In fact, it's over 99% accurate.* Which means you can now recognise a greater variety of documents — including poor-quality copies and degraded faxes — with a higher degree of accuracy than ever before.

- Over 99% accurate
- Easy, one-button OCR
- Automatic proofreader
- Retains your original page layout
- Superior integration with Microsoft Word
- On laser quality documents using standard fonts



OMN021 Omnipage Pro 9.0 u/G (OEM) ONLY $179 when purchased with a scanner

Omnipage 9.0 U/G (Upgrade from ANY OCR Software) OMN020 **$199**

WebSearch Code: OMN020

OmniForm 4.0

Electric Forms the Easy Way - Instantly!

NEW VERSION

Take any paper form, scan it with OmniForm, and wow! You've got an electronic form that you can fill out right on your computer screen! But that's only the beginning of the amazing versatility of your electronic form. You can store it for re-use, print it whenever you want, e-mail it, keep its data in a database — electronic forms are just plain better than the old-fashioned paper kind. And OmniForm is the easiest, best way to scan or create electronic forms.

OMN115 **$289**

WebSearch Code: OMN115

Omnipage WEB

NEW PRODUCT

OmniPage Web is the fastest, easiest way to convert multipage paper documents into working Web sites. Using the award-winning OmniPage Pro OCR engine and the revolutionary new Logical Structure Recognition. (LSR) technology, OmniPage Web outlines your scanned document and creates a complete, dynamic Web site with separate Web pages for each page, chapter or section. OmniPage Web automatically cross-links references and even creates a hyperlinked table of contents and navigation tools! Preview your site in your favourite HTML browser or editor, then publish it to the Web — OmniPage Web makes the process of going from paper to the Web faster and easier than you ever thought possible.

OMN019 **$799**

WebSearch Code: OMN019

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Wasting too much time on the road? Get LapLink Professional and get productive

LapLink Pro lets you work whenever and wherever it's convenient for you. When you need to share information between an office PC, a laptop, or your home PC while travelling or working away from the office, LapLink Pro will get you connected.

LapLink Pro sets the standard in usability and is the #1 rated choice for easy, speedy and reliable remote control and file transfer by mobile professionals and telecommuters.

- Single mode operation - no need to set "guest" or "host" modes
- Includes bonus Windows CE remote control software
- Adaptive compression automatically gives optimal speed over all connections
- Optimised for Windows 98
- Compatible with Windows 3.1, 95, 98, and NT
- Supports USB cable for faster file transfer
- Smart Install configures all devices automatically - no user intervention required
- Integrated scheduler for Windows 98, 95,NT
- Print redirection from remote PC to local printer, or to a remote PC's printer

WebSearch Code: LAP011

LAP011 **$169**

Laplink Tech

Put the ultimate support and setup tools to work for you

LapLink Tech provides the tools you need to remotely support customers, set up and upgrade PCs quickly and defend against viruses - all in one complete solution. No matter where your customers are or where you work, LapLink Tech offers you the flexibility to support your customers whenever they need it. LapLink Tech is designed for Windows 95 and NT 4.0, and is completely compatible with Windows 98. It also works with any earlier version of LapLink for Windows or Remote DeskLink.

Its Remote Control and File Transfer capabilities mean you won't have to leave your desk to work with remote users. Disk cloning speeds system installation and upgrade tasks, while virus protection defends your system. Plus our industry-leading useability makes sure you gain benefits right away.

Laplink offers all the key tools to make remote support and system setup a snap:

Features

- Remote Control
- Simultaneous Voice Chat
- File Transfer
- Automated File Synchronization
- Print Redirection
- Security
- Cross-platform compatibility
- Disk Cloning
- Virus Protection - WinGuard

WebSearch Code: LAP009

LAP009 **$259**

CD Phone Directory

Access to Over 8 Million Business & Residential Listings Australia Wide

Imagine how much easier and faster it would be if you had virtually every Australian business & residential telephone number on your own PC!

Now includes Mobile Numbers, International Codes, Fax Numbers, as well as:

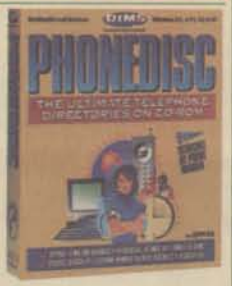
- ✔ Gives instant access to over 8,000,000 business and residential listings across Australia!
- ✔ Search by Company Name, Line of Business, Surname & Initial, Suburb, State or Postcode!

WebSearch Code: DTM011

DTM011 **$19**

Phonedisc

With Search by Phone Number!



A powerful tool for finding what you want and who you want in seconds!

Imagine the advantages of a telephone directory that not only gives you much more information, but gives it to you the way you want it!

Features:

- ✔ Search by Name, Company, Initials, Surname, Suburb, state, Postcode or line of Business
- ✔ Full Boolean search capability
- ✔ "Sounds-like" facility
- ✔ Auto dialer facility
- ✔ Contact sensitive on-line help

WebSearch Code: DTM001

DTM001 **$89**

Lotus Notes

NEW PRODUCT

What is Notes R5? Lotus Notes R5 is state-of-the-art e-mail, calendaring, group scheduling, Web access and information management — all integrated in an easy-to-use and customizable environment.

Key Benefits include:

Ease of Use Notes makes it easy to find, sort and manage all your work. Automated wizards and preset configurations make installation and e-mail setup easy too.

More than Mail Notes integrates your e-mail, calendar, address book, to-do list, and the Web — and streamlines daily information management. What You Need, When You Need It. A customizable Welcome Page summarizes your most important information in one display. Use the Bookmark Bar to create quick links to frequently needed information.

Lets You Work Anywhere Notes synchronizes data with your laptop and personal digital assistant (PDA) so you can take e-mail, appointments, to-do's, contacts and more on the road.

To find out what Lotus Notes R5 can do for your business, visit our website at www.iswh.com.au or call our team on 1 300 300 003.

WebSearch Code: LOT528

LOT528 **$125**

DDD001	Australia on Disc Business	$329
DDD002	Australia on Disc Residential	$329
DDD003	Australia on Disc Business & Residential	$529
NET155	Net Objects Fusion 4.0	$535
MSS161	Microsoft Exchange 5.5 & 5 Clients	$1529
MSS133	Microsoft Exchange 5.5 Upgrade	$549
DTM002	DtMS Fax Pro	$275
SEA184	Seagate Crystal Reports 7.0 Pro	$649
RMG212	SideKick 98	$79
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FIL006	FileMaker Pro 4.1 5-Pack	$1469
FIL005	FileMaker Pro 4.1 Upgrade	$235
CLA060	FileMaker Pro 101 Database Solutions	$19.95
PRO529	ProComm Plus 32 4.7	$209
ART047	Modem Share V7 - 2 Ports	$245
ART058	Modem Share 32 - 1 Port	$195

pcAnywhere 9.0 SYMANTEC.

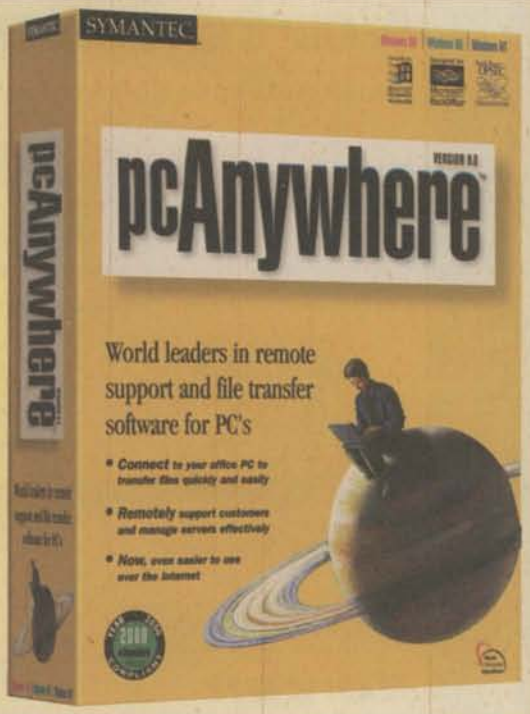
The #1 seller for fast, easy access to any PC

NEW VERSION

If you need to work from home or on the road, pcAnywhere lets you connect to your office PC to transfer files quickly and easily. Its special optimised design ensures the best possible performance at any connection speed. You can also run applications that reside on your office PC or a corporate server - a great feature for software that's too large to keep on your laptop or that can't be installed on external computers for security reasons. pcAnywhere supports a wide range of connection methods - including standard modems, ISDN lines, TCP/IP and IPX/SPX networks, direct cable, and infrared connection-so wherever you are, you're sure to find one that meets your needs. And now, it's even easier to use over the Internet.

If you're an IT professional, pcAnywhere lets you remotely support users and manage servers effectively. Monitor and control remote laptop and desktop systems to troubleshoot problems. Deliver training materials and pre-configured software updates to multiple users. Manage LANs, WANs, and even enterprise-wide information systems.

Version 9.0 features an enhanced file transfer interface, powerful centralised management and control, greater security, and LDAP directory services. And you can access all pcAnywhere functions through one clean, consistent interface.



SYM214
$209

WebSearch Code: SYM214

COMMUNICATION

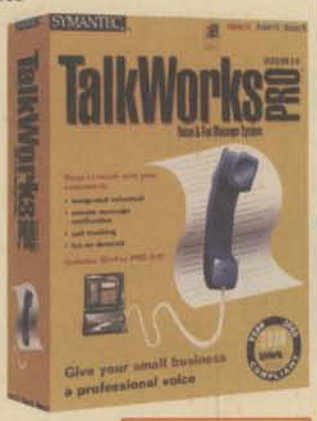
TalkWorks PRO 2.0

Give your small business a professional voice

TalkWorks PRO 2.0 from Symantec brings professional voice and fax messaging to home offices and very small businesses. Its integrated capabilities keep you in touch with your customers 24 hours a day.

With TalkWorks Pro 2.0

- Set up separate mailboxes for employees, fax on demand, and other purposes.
- Fax-on-demand allows you to provide your customers with information at any time.
- Get remote notification when a voice or fax message arrives.
- Track faxes and voice calls.
- TalkWorks PRO 2.0 even supports Caller ID*.



Caller ID service from telephone service provider and caller ID-capable modem required for some features.

SYM193
$199

WebSearch Code: SYM193 SYMANTEC.

WinFax Pro 9.0

The world's #1 choice for hassle-free faxing!

WinFax PRO 9.0 software takes Symantec's industry-leading fax solution to new levels of flexibility, reliability, and ease of use.

With WinFax PRO 9.0

- Small businesses can look more professional by sending crisp laser-quality faxes.
- Workgroups can save money by sharing a fax modem and phone line though a non-designated fax host.
- It can also notify mobile users via pager or PCS cell phone as soon as an important fax arrives, or automatically forward faxes to another fax number or an e-mail address.

NEW PRODUCT

Mobile WINFAX for the palm-computing platform.

The worlds leading fax software is now available for the Palm Pilot.

WinFax Pro 9.0
SYM191
$125

Mobile WinFax
SYM218
$75

WebSearch Code: SYM191
WebSearch Code: SYM218 SYMANTEC.

ACT! 4.0

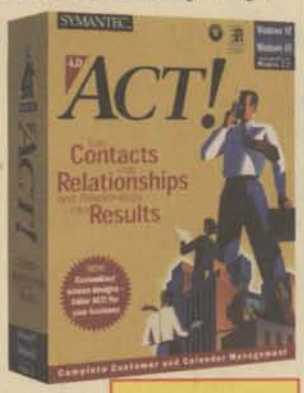
Complete Customer & Calendar Management

Nobody knows your customers better than you do. The trick is remembering the right things about them at precisely the right time. ACT! 4.0 puts the information you need within easy reach - phone numbers, addresses, order history, even invoice dates.

- Leverage the Internet
- Stay connected online
- Become a genius with details
- Manage every day more efficiently

Features

- Now includes business templates for major businesses across Australia
- Flexible customer database - Get started right away with 70 preset user fields
- Customise the database with your own fields, custom screens and on-line forms
- Attach files, such as spreadsheets and documents, to your contacts



SYM179
$145

WebSearch Code: SYM179 SYMANTEC.

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VALUE LICENCE
PROGRAM

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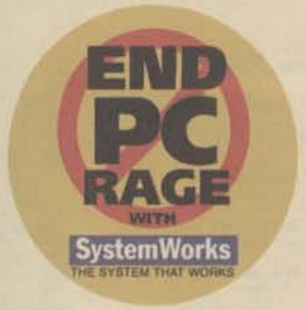
Norton AntiVirus 2000

NEW VERSION

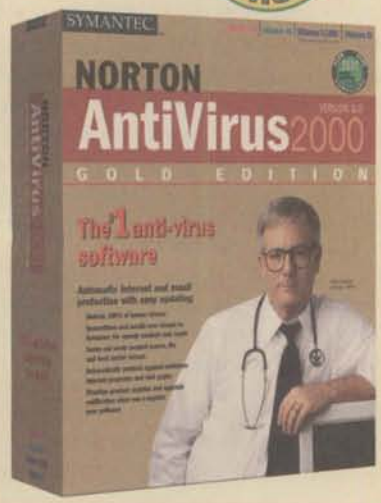
The #1 Anti-Virus Software in the world

As always, Norton AntiVirus 2000 will run constantly in the background to keep your computer safe from viruses and it can be scheduled to automatically retreive new antivirus definitions from Symantec as often as once a week.

- Eliminates todays and tomorrows new ones.
- Live Update offers weekly downloadable virus updates.
- Helps you wipe out new viruses as quickly as they appear, using Scan and Deliver.



- **Graphical Alerts - New!** Provides clear, easy-to-understand instructions on how to proceed when a virus is detected.
- **Email Scanning - New!** Scans incoming email attachments automatically for the most popular email products, preventing viruses from even entering your system.
- **Compressed File Detection and Repair - Improved!** Eliminates viruses hidden in multiple compressed layers automatically.
- **Ease-of-Use - Improved!** Provides increased integration with Norton SystemWorks.



NOR113
$79

WebSearch Code: NOR113

Norton Cleansweep 2000

NEW VERSION

Removes Unwanted Programs and Files

Clean out Internet build up with the award winning leader Norton CleanSweep 2000. Improve your PC's performance by safely and easily removing un-needed programs and files.

- Removes the widest array of unneeded programs and files for maximum space savings, including Internet cache and history files, "Cookies," and ActiveX controls.
- Provides automatic protection against accidental file deletion - no other clean-up product is as safe.

NOR111
$59

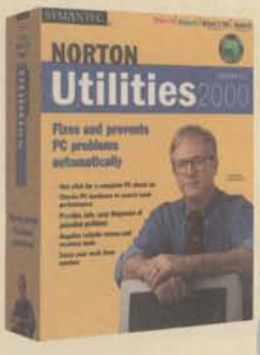
WebSearch Code: NOR111

Norton Utilities 2000

NEW VERSION

Norton Utlities 2000 is the market leading solution for fixing, maintaining and optimising PC's.

- **Windows Hardware Diagnostics - New!** Checks and tests your PC hardware (including your hard disk, CD-ROM, memory, sound card, etc.) to ensure it's working properly and at peak performance.
- **SpeedDisk - Enhanced!** Optimizes your hard disk faster than before while using less disk space.
- **Ease-of-Use - Improved!** Provides increased integration with Norton SystemWorks.



NOR112
$79

WebSearch Code: NOR112

Norton Ghost

Norton Ghost Personal Edition is a powerful disk drive cloning and imaging utility that speeds up and simplifies PC system migration, hardware upgrades, hard disk backups and disaster recovery operations. Technically savvy home computer enthusiasts will appreciate its flexible and "no-frills" interface that gives them exacting control over the process. Norton Ghost Personal Edition is based on Norton Ghost Corporate Edition, the world's most widely used PC cloning utility, which is recommended and used by more IT managers than any other solution.

Features

- Easily migrate data, applications and system settings to a new PC
- Restore drive image or specific files in case of disaster
- Clone existing hard drives to new hard drives
- Create a compressed backup of an entire hard drive

NOR106
$119

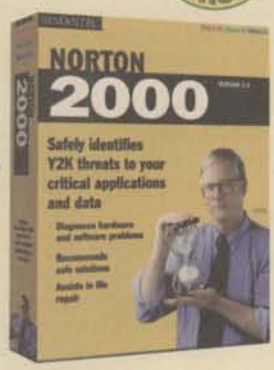
WebSearch Code: NOR106

Norton 2000 v2.0

NEW VERSION

The new features for Norton 2000 version 2.0 include more administrative functionality for tracking the remediation effort and helping end users correct their year 2000 problems. The new features allow you to:

- Assist in the remediation tasks by using the new Fix Assistant for Microsoft Excel.
- Filter the log window results from the Data Scan by severity, issues, errors, and notes.
- Scan Data within ZIP files.



NOR114
$45

WebSearch Code: NOR114

Norton Systemworks 2000 Standard Edition

AS SEEN ON TV!

END PC RAGE WITH SystemWorks THE SYSTEM THAT WORKS

NEW VERSION

Norton SystemWorks gives you five easy-to-use utilities in one fully integrated suite. It features the latest complete versions of award-winning Symantec products. Norton Utilities is the industry leader in fixing and preventing computer problems. Norton AntiVirus offers the world's most powerful anti-virus capabilities. Norton CleanSweep safely and completely removes unneeded files. Norton CrashGuard protects your work against system crashes and screen freezes. And access to Norton WebServices helps you keep your system up to date. Norton SystemWorks is the most comprehensive, easy-to-use utility solution you can buy.

Norton SystemWorks 2000 for Windows 98/95 is the only fully-integrated and market-leading utility suite designed to protect your computer from viruses and crashes, solve problems, remove unneeded files, and update your applications.

Everything you need in one fully integrated suite:

- Norton AntiVirus 2000
- Norton Utilities 2000
- Norton CleanSweep 2000
- Norton CrashGuard 2000
- Norton Web Services

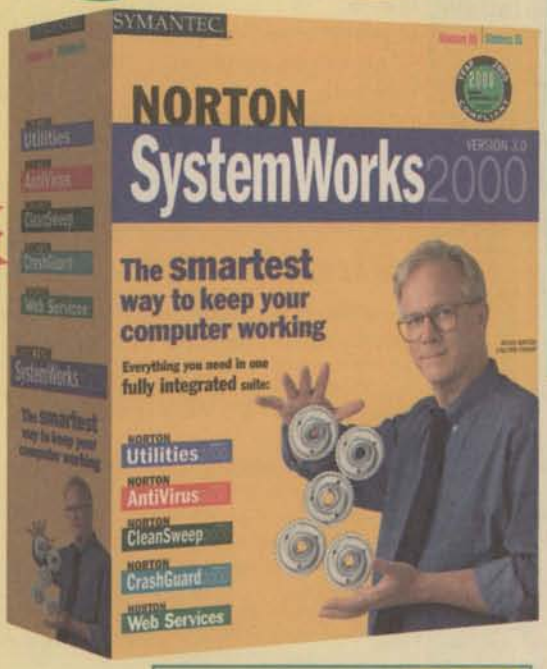
Keep your PC up-to-date and running smoothly with tools that leverage the power of the Internet:

- Norton Web Services
- LiveAdvisor

Norton SystemWorks is:

- Comprehensive, offering award winning, full-version products in the major utility categories: virus protection, problem solving, uninstall capabilities, crash protection, and application updating.
- The only truly integrated suite available, providing unparalleled balance between performance and protection.
- Easy-to-use, with a newly designed interface for easy access to all features from one central location, as well as automatic protection of your data.
- The recognized industry standard, winning numerous awards and accolades.
- An incredible value, offering five award-winning products.

OVER $300 VALUE!



NOR109
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ONLY
$129

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EDUCATIONAL pricing AVAILABLE

WebSearch Code: NOR109

Norton SystemWorks 2000 Professional Edition

NEW PRODUCT

Norton SystemWorks 2000 Professional Edition combines the worlds #1 utility suite with advanced tools for PC experts. Fix and prevent windows problems, find year 2000 bugs, and clone entire systems- all for one great price. Don't take chances with your PC. Keep it working with Norton SystemWorks 2000 Professional Edition.

An incredible value, offering five award-winning products, plus advanced utilities, Norton 2000 and Norton Ghost for PC experts. Also included in SystemWorks 2000 Professional Edition is a free Bonus Pack.

Everything you need in one fully integrated suite:

- Norton AntiVirus 2000
- Norton Utilities 2000
- Norton CleanSweep 2000
- Norton CrashGuard 2000
- Norton Web Services

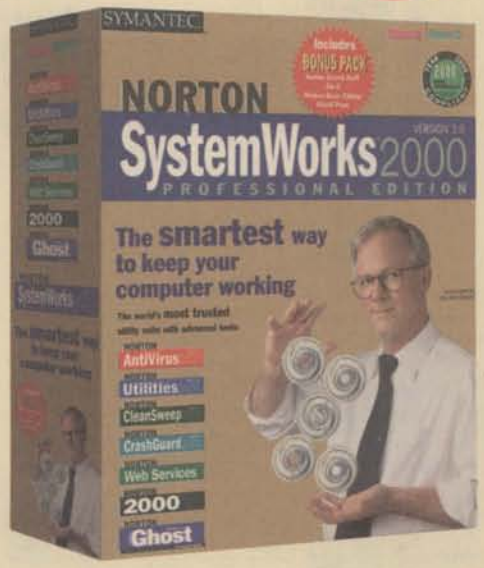
Includes Professional Pack:

- Norton 2000
- Norton Ghost

Plus Bonus Pack:

- Zip It (File Extraction & Compression)
- WinFax Basic Edition (PC Faxing)
- Norton Secret Stuff (Internet Email Privacy)
- Visual Page (Web Development Tool for building and managing web pages)

OVER $700 VALUE!



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WebSearch Code: NOR110

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TERMS & CONDITIONS
All prices include Sales Tax. Prices subject to change, see page 46 for terms and conditions.

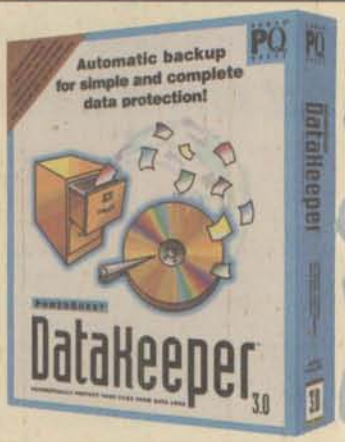
DataKeeper

NEW PRODUCT

With PowerQuest DataKeeper, you'll never have to worry about being without a backup again. DataKeeper continuously monitors file activity in the background and makes compressed backups on the fly, keeping you protected against data loss.

Powerquest DataKeeper is the first "real-time" back-up solution that automatically backs-up combinations of drives, folders or files every time they're changed. You can even choose to automatically back-up to a removable media.

Don't get caught without an adequate backup! With PowerQuest DataKeeper, you'll never have to worry about being without a backup again. DataKeeper continuously monitors file activity in the background and makes compressed backups on the fly, keeping your system protected against data loss. Rest Easy. Use PowerQuest DataKeeper 3.0.



Features:
- Password protection and encryption
- Fault-tolerant backup sets
- Complete registry protection
- Continuous backup and monitoring
- Easy-to-use Windows interface
- Flexible backup profiles
- File compression and versioning
- Multiple storage options available
- Disk Spanning

WebSearch Code: POW035

POW035
$89

WinZip 7.0

The ultimate Companion for Internet Downloading

WinZip brings you the convenience of Windows to the use of ZIP files without requiring PKZIP and PKUNZIP. It features an intuitive point-and-click drag-and-drop interface for viewing, running, extracting, adding, deleting, and testing files ZIP, LZH, ARJ, and ARC files.

Internet Surfers:

WinZip makes it easy for you to access almost all of the compressed files you download from the Internet. WinZip features built-in support for Zip, TAR, gzip, Unix Compress, UUENCODE, BinHex, and MIME files.

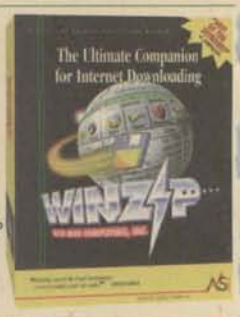
The Zip Advantage:

Zipping safely compresses the data in your files, so that your files occupy less space. This allows you to save more time by speeding up file transfers.

WebSearch Code: WIN119

CORPORATE SITE LICENCES AVAILABLE

Key Features
- Drag & Drop to or from the explorer, or ZIP & UNZIP without leaving the Explorer
- Drop files on a printer to print
- With the easy to use tool bar you have the convenience of Windows when Zipping
- Optional WinZip Wizard Interface
- Optional virus scanning support
- Built-in PKZIP-compatible ZIP and UNZIP (PKZIP and PKUNZIP are not required)
- Simplify file distribution by making files that unzip themselves
- Tight integration with the Windows 95/98/NT shell
- Works with ARJ, ARC, and LZH files
- Supports Windows 3.1, 95, and NT
- 32 and 16 Bit versions included



WIN119
$65

McAFEE VirusScan 4.0

#1 Virus Detection and Removal

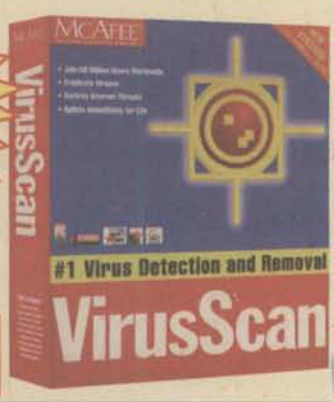
VirusScan is the cornerstone of Total Virus Defense, protecting desktop computers from virus infection and damage. More than 25 million people, 80% of the Fortune 1,000 and 40,000 organisations worldwide choose McAfee's VirusScan to keep their computers safe, because VirusScan has an unparalleled record of finding and eliminating viruses that reside on the desktop.

Detect and Destroy ALL viruses

McAfee Macro Hunter technology safeguards your PC from all virus types and from all potential sources. Virus Scan stops destructive Active X and Java applets often downloaded from the Internet. It scans all your e-mail attachments right inside your mailbox, so viruses never reach your system. SecureCast prepares you by using Internet "Push" technology to deliver virus updates directly to your desktop, automatically for the life of the product.

WebSearch Code: MCA070

CRAZY DEAL! SPECIAL OFFER $60 CASHBACK OFFER ENDS 30 SEPTEMBER



MCA070
$69

VET Premium Anti-Virus

Virus Protection For All Platforms

AUSTRALIAN MADE

Essential Protection

Virus protection has never been as essential as it is today. New viruses are continuing to appear at an ever-increasing rate and new types of viruses - for instance Word macro viruses - regularly take the PC World by surprise. The internet, intranets, networks, Email, shared disks and shared PCs all enable viruses to spread. Vet Anti-Virus Software provides you with the protection you need for your system, whether it is a stand-alone PC or a complex network of PCs in an organisation.

This combines all the advantages of Vet Net Surfer with the additional benefit of mailed quarterly upgrades - delivered to your home or office. The choice is yours - Vet Net Surfer with on-line upgrades, or Vet Premium with on-line and mailed upgrades. Both offer complete virus protection for you PC.
- Unlimited phone and email support
- Unlimited access to upgrades on-line
- Upgrades mailed quarterly direct to you

WebSearch Code: VET007
WebSearch Code: VET006

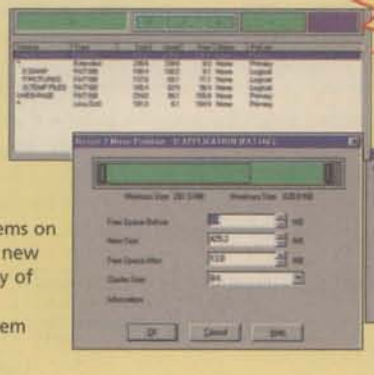
Vet Net Surfer (updates via Internet only) VET006
$75

Vet Premium VET007
$89

PartitionMagic 4.0

Reclaim up to 40% of your hard disk & organise your hard drive!

PRESTO! Optimise your hard drive without destroying data



Create, resize and delete partitions with the drag of a mouse.

Reclaim Wasted Disk Space

Everyone wants to get the most they can out of their hard disk. But, up to 40 percent of your hard disk may be totally wasted due to inefficient storage methods. PartitionMagic 4.0 increases your usable disk space by shrinking large FAT partitions and restructuring cluster sizes to reclaim up to hundreds of megabytes of lost disk space.

Safely Run Multiple OS's

PartitionMagic 4.0 makes it easy to run multiple operating systems on the same machine without compatibility problems. Explore the new world of Windows 95, 98 or NT while still relying on the security of your current operating system. And PartitionMagic 4.0 includes BootMagic from IBM, making it easy to select an operating system every time you boot your computer.

Organise and Protect Data

Create a physically separate partition for your valuable data files to protect them from potentially unstable applications. This simplifies backups, especially to devices like ZIP drives. And with the transport feature of Uninstaller, PartitionMagic 4.0 lets you easily move applications from one partition to another with their files and operating system settings in place.

WHAT THE PRESS SAY..

"Unique, dazzling and indispensable, PartitionMagic is a must have product in an era of larger and larger hard disks"

PC Magazine

WebSearch Code: POW033
WebSearch Code: POW034

PartitionMagic 4.0 Upgrade
POW033
$59

PartitionMagic 4.0
POW034
$89

UTILITIES

Drive Image

The complete imaging solution for hard drive backups, upgrades and data recovery

Drive Image lets you easily create a compressed image file of an individual partition or an entire hard drive. This file can be stored on a network, JAZ, ZIP, CD-ROM or tape drive and the download to make quick work of backups, data recovery or upgrading to a new, larger capacity hard drive, With Drive image, image files can be downloaded to drives of the same size or resized to fit drives of a different size and geometry for maximum flexibility.

WebSearch Code: CHK007

CHK007
$105

Drive Image Pro 3.0

If it's not Drive Image - it's not an Exact Image!

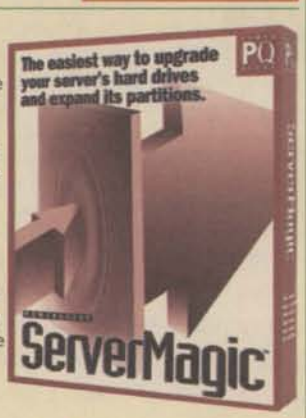
Drive Image Pro 3.0 is a hard-disk imaging solution for IS professionals, service providers, and configuration centres.

WebSearch Code: CHK025

* minimum 10 users

CHK025
$35 per user*

ServerMagic



Until now, even the fastest IS administrators had one thing in common, they couldn't get away from the office. Invariably, maintaining a network meant spending long hours in front of a computer, even on the weekends. Fortunately, there's ServerMagic from PowerQuest.

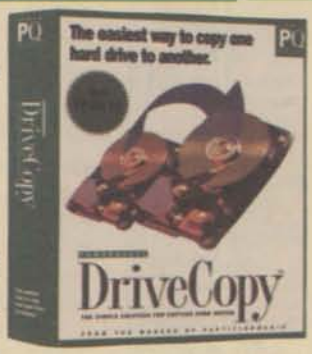
As the only network management tool with the power to safely and painlessly upgrade your hard drive and modify your server's partitions on-the-fly, ServerMagic lets you quickly copy and expand entire NetWare, NT Server and DOS partitions directly from one hard drive to another. All without losing a single trustee right, directory setting or byte of data. And ServerMagic even works with hardware RAID systems.

WebSearch Code: CHK008

CHK008
$669

DriveCopy 2

The safest, easiest, and most affordable way to copy everything from your old hard drive to your new hard drive



There was a time when upgrading to a new hard drive meant hours of downloading your data, applications, and operating systems to disk; then hours more of reinstalling everything to your new hard drive. If it all went well, you could be looking at a few days worth of work. Of course, there was always the risk of scrambling your data or losing it altogether in the process. Fortunately, now there's DriveCopy from PowerQuest. With a few simple steps, everything from your old hard drive is automatically copied to your new one without losing a single preference, setting, or byte of data. With DriveCopy you can now run your operating system, applications and data on a new, larger and faster hard drive.

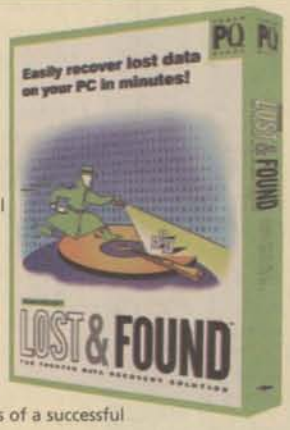
So go ahead - update your dinosaur with a new high-capacity hard drive. With DriveCopy, it's never been easier or more affordable.

WebSearch Code: CHK022

CHK022
$49

Lost & Found

Restoring lost data is just a few keystrokes away



Rather than spending thousands of dollars to send your hard drive to a data recovery centre, Lost & Found lets you automatically recover and restore data after accidental (or even intentional) data loss, or from corrupted media caused by a disk crash or logical system failure.

What makes Lost & Found an easier, more effective data recovery system?

Unlike other data repair and recovery software solutions, Lost & Found:

- Does not need to be installed prior to the recovery of lost or corrupted files.
- Does not alter, write to or attempt to repair critical sectors on the damaged disk, increasing the chances of a successful data recovery.
- Recovers your files even after reformatting, as long as you have not written over them.
- Performs a disk analysis and reports the odds of recovery via colour coding. Allows you to save data to a network drive.

WebSearch Code: POW041

POW041
$89

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* where applicable

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TERMS & CONDITIONS

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Greenwich Mean Time

Check 2000 PC Deluxe

The Ultimate tool for beating the Millennium Bug!

Check 2000 PC Deluxe is the only integrated year 2000 testing tool that addresses all five "at-risk" layers of your PC. You can correct the BIOS, test the operating system and software programs, scan your data files, and flag data importing issues.

CHECK 2000 PC Deluxe gives you more:

- ✔ Helps find and correct the year 2000 hardware (BIOS) problems on the spot
- ✔ Flags problems in software programs, includes the world's largest database of remediation advice
- ✔ Lets you check new data from e-mail, internet, disks, CDs and other outside sources as often as you like
- ✔ Scans all the way down to individual cells in spreadsheets, databases, and other data files
- ✔ Helps you prioritize software and data problems for timely repair

GRE002 **$85**

"Today CHECK 2000 is established as the standard by which other year 2000 products are measured"
Microsoft Y2K Resource Centre.

WebSearch Code: GRE002

1 *Test and Help Correct BIOS*

A simple pass/fail screen tells you if your BIOS passes or fails the critical date tests. Then Check 2000 PC Deluxe will help correct the problems for you in 98% of BIOS types.

2 *Check Your Operating System*

Check 2000 will test your operating system, identify any 2-digit settings, and then recommend the changes you need to make. We check all of the popular operating systems, including: Win95/98, NT 4.0.

3 *Keep Checking Imported Data*

Check 2000 PC Deluxe identifies software programs that import and export data. Then Data Scanner finds date-dependent data so you can correct it.

4 *Analyse Software Programs*

Every application treats date-dependent data a little differently. Check 2000 PC Deluxe will do an inventory on your application programs - and show you which programs are most at risk (usually it's spreadsheets, databases, and schedulers). Year 2000 advice is provided on over 5,000 software programs. The knowledge base built into Check 2000 PC Deluxe recognises over 20,000 programs.

5 *Pinpoint and Prevent Data Problems*

Drill all the way down to the individual cells in spreadsheets- and other data files - that could cause problems. Correct the data as it's revealed to you by Check 2000, without switching between software programs. You can run the Data Scanner at any time, to continually reveal any new date-dependent data that comes into your PC.

CHECK 2000 PC

What CHECK 2000 PC does for you:

- Finds and eliminates hardware date problems in 98% of BIOS types by correcting the PC BIOS system clock.
- Provides free technical support for 90 days.
- Analyses your software.
- Provides detailed advice.

GRE001 **$59**

WebSearch Code: GRE001

CHECK 2000 Client Server

Scans your network to find and help fix Year 2000 PC problems

Only Check 2000 Client Server does all this and more...

- Performs a detailed hardware and software audit of your network
- Collates network data into one common database
- Supplies a top-down view of your year 2000 readiness
- Offers ongoing risk assessment to maintain your protection, as you change and add to your network

GRE005 **$369**

WebSearch Code: GRE005

Fix-It Utilities 99

New from Mijenix, the makers of ZipMagic, FreeSpace and PowerDesk comes a brilliant new product to keep your PC in tip-top condition. Fix-It includes a myriad of utilities that check, clean, protect and secure your PC (Win 95/98 and Win NT).

Fix-It Utilities includes:

- Crash Protection
- Disk Fixer
- Disk Defragmentation
- Smarter Drive Optimising
- Clean & Optimise the Registry
- Hardware Diagnostics
- Bring back trashed files
- Virus Protection
- Year 2000 Tools
- Win 95, 98 & NT
- Emergency Disk Included!
- PowerDesk, valued at $59.95 bundled FREE
- From Mijenix the makers of ZipMagic
- Winner PC Week Best of Comdex Award
- Head to Head winner against Nuts & Bolts & Norton Utilities

Fix-It Utilities 99 includes just about everything that you could need.. and it sells for under $100! Even if you have Norton's Utilities you will immediately see the additional benefits you get from Fix-It Utilities 99.

MIJ001 **$85**

WebSearch Code: MIJ001

GRE008	Check 2000 Check & Fix	$25
MIL100	Millennium Buster No. 1	$29
MIL101	Millennium Buster No. 2	$89
MCA053	Toolbox 2000	$45
MCA158	First Aid 2000 Deluxe	$89
RMG211	First Aid 98	$29
UNI006	UnInstaller 4	$45
UNI010	UnInstaller Deluxe	$85
CYB024	Guard Dog Deluxe	$85
KIS042	KISS KeyView Pro	$59
MCA046	McAfee Security Suite	$105
MCA146	PGP Personal Edition	$69
HEL003	Nuts & Bolts Deluxe	$99
MCA054	Nuts & Bolts 98	$89
TOU004	CheckIt V5 Professional	$135
CHK011	Star Trek DS9 Voice Print Security System	$35

Snappy Deluxe

NEW PRODUCT

Get thousands of pictures from any source! Any thing your camcorder can see, any image on your VCR, any scene on TV and any action shot from your Nintendo, Sega, or Playstation can now be seen as a stunning high resolution picture on your PC.

Snappy Deluxe is the award winning, best selling video add on of all time. Just plug the module into your PC or laptop parallel port. Then connect your camcorder, VCR etc with the included cable. Watch your screen, and when you see a picture that you want, just click SNAP. Its that simple! Perfect for a thousand and one uses, such as desktop publishing, presentations, web pictures, PC photo albums, school projects or simply for having fun. You won't believe your eyes!

And Snappy Deluxe now allows you to record colour mini-movies with sound, and save them as AVI files (up to 2 frames per second).

The Most Award-Winning PC Video Product in History

Award-Winning Software Package Includes:

Adobe Photo Deluxe 2.0 - Paint, title, and retouch images. Make professional newsletters, customise greeting cards, and much more!

Gryphon Morph 2.5 - Hollywood's morphing magic, right on your PC! Morph your brother into your dog or your friends into TV stars!

Kai's Power Goo SE - Turn your friends and family into hilarious animated cartoons and caricatures.

WebSearch Code: PLAY03

PLAY03
$419

UTILITIES

Amorphium

NEW PRODUCT

Now anyone can create amazing 3D graphics! Amorphium lets everyone from school kids to graphic artists, from web designers to Hollywood animator, make stunning 3D graphics. Amorphium is easy to use, but its also incredibly powerful, made by the same people who created the 3D technology for movies such as Terminator 2, Titanic and Star Wars Special Edition.

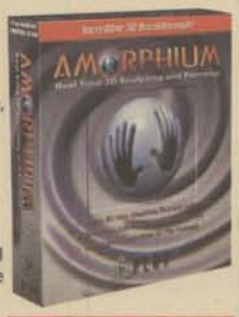
Create - mould 3D images as if you were moulding clay. Push, pull, twist and tweak all in real time.

Animate - powerful animation tools lets your creations jump, bounce and wiggle. Save your animations as movies or GIF files for the web.

Paint - add colours straight onto 3D shapes. Create textures, add shine, move lights, create shadows. Its easy with Amorphium.

Compose - Combine objects, pick backgrounds, even add fog and smoke to your scene. Then save it all in any standard file format (BMP, JPG, TIFF, GIF and many more).

Whether its for a presentation, web site or just for fun, Amorphium lets you create 3D graphics quickly and easily. (32Mb RAM required).



WebSearch Code: PLAY02

PLAY02
$389

Beeline

NEW PRODUCT

BeeLine is an award-winning global automated search program that quickly gathers Internet results from the most popular web-based search engines to deliver complete and fast answers to search requests. BeeLine understands plain English requests.

- Find Information on the Web!
- Read the Latest News!
- Locate Email Addresses!
- Download the Latest Software!
- Keep track of Articles posted in Newsgroups!
  Turn banner advertising off!
- A spellchecker and a thesaurus are included to help you refine your search. Search queries and results are automatically saved allowing you to browse them offline or use them again at a later stage.
- Search over 40 search engines simultaneously! Click here for further details.
- Save and export searches!
- BeeLine includes a powerful Auto-Update feature which checks if the search module is up to date. As Internet search technology evolves and new search engines become available, software updates will be made available on a regular basis which will update the BeeLine search module automatically with one simple click. Your copy of BeeLine will never be outdated!

WebSearch Code: BEE001

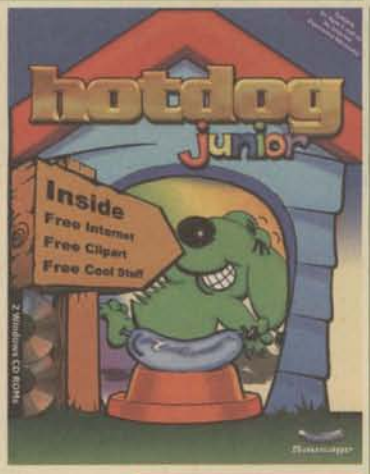
BEE001
$55

HotDog Junior Deluxe

NEW PRODUCT

Let your kids create their own home on the Internet! HotDog Junior is a simple and fun software program for making Web Pages, designed especially for children aged 6 and up. In four basic steps HotDog Junior allows kids to quickly create and design their own Web Pages, and then publish them to the Internet.

Absolutely no experience is necessary! HotDog Junior leads you through each step. You can have a Web Page on the Internet in just five minutes. Also includes 50,000 free Clipart Images and 50 hrs free Internet Access.



WebSearch Code: SAU001

SAU001
$65

Gizmos 98

NEW PRODUCT

An amazing software suite that adds break through tools and essential new functions to fix deficiencies in Windows. Gizmos 98 addresses four areas of Windows 95, 98 and NT - namely file security, picture management, desktop accessories and visual entertainment.

Picture Management Gizmos

- **Picture Explorer** - a new Gizmo to finally locate and organise all your unruly images.
- **Performer 98** - allows you to create TV style presentations with a few mouse clicks.

File Security Gizmos

- **Encryption** - scrambles data so as to make it unreadable to anyone who doesn't have the appropriate passphrase
- **The Shredder** - ensures the files you delete stay gone by overwriting the unwanted data in one, three or seven passes to make shredded files absolutely irretrievable.
- **The Vault** - your safety-deposit box for encrypted files.

Desktop Accessories

- Atomic Clocks
- 3D Calculators
- Internet CD Player
- Photo Calendars

Visual Entertainment

- Screen Savers
- Desktop Themes
- Picture Puzzler
- 3D Card Games

WebSearch Code: PLAY01

PLAY01
$129

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* where applicable

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10.00am 'til 3.00 pm (EST) Saturday

TERMS & CONDITIONS

All prices include Sales Tax. Prices subject to change, see page 46 for terms and conditions.

MAUS Stockmarket Plus

Easy Start Sharemarket Software

Over 5.5 million Australians are now investing in the stock market.....grab your slice of the action!

3 Great Reasons to Choose MAUS Stockmarket Plus

1. **Portfolio Manager** - Records every aspect of your share portfolio you'll ever need in an easily accessible format.
2. **Charting & Query Tools** - Pinpoint new and exciting investment opportunities using the user friendly charting and query functions.
3. **Instant Tax Reports** - Save literally hours of frustration at tax time using the automatically generated Australian Tax Reports.

AUSTRALIAN MADE

Key Benefits
- Professional investment advice in simple English
- Manage stocks, personal finances, property, etc
- Track investments in any ASX listed company
- Download stock prices for fast, accurate analysis

MAUS Stockmarket Plus...."is ideal for both novice and experienced investors who require a package to keep track of their stockmarket investments....

Seldom does a software package completely outclass competitors, offering users a clearly superior product in terms of sophistication, simplicity and obvious attention to detail"
Review of core software - Personal Investment Magazine, 1997

MAUS Stockmarket Plus...."is specifically designed for monitoring a share portfolio and has the added advantage of providing analytical tools as well as keeping the records you need"
Review of core software - Editor of Money Section (SMH 17/9/97)

WebSearch Code: MAU007

MAU007 $165

MAUS Debt Collector

The easy approach to debt collection

MAUS Debt Collector is a complete debt collection system which automatically mail merges reminder and demand letters, reminds you of phone calls and action to take, and prompts you step-by-step through the entire debt collection process. To monitor your success, this revolutionary new product includes a unique graphing and reporting feature to quickly assess your current debtor position.

AUSTRALIAN MADE

Key Benefits
- Automatically sends 30, 60 and 90 day reminder letters
- Stand alone contact manager stores all debtor details
- Includes professional letters, legal documents & advice
- Reduce bad debts
- Links Directly to MYOB, Quickbooks and most accounting systems.

WebSearch Code: MAU009

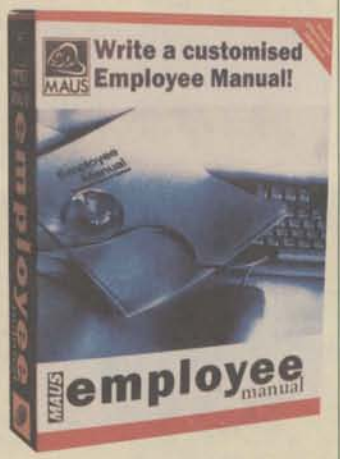
MAU009 $165

MAUS Employee Manual

Create a Customised Employee Manual!

MAUS Employee Manual is the simplest way to create a handbook encompassing all of your organisation's employee policies and procedures. It comes complete with sample policies that you can use, in addition to all the important forms you may need.

The program's unique step-by-step process will ensure that your business has its own customised manual, protecting it from all-too-common litigation in areas such as Unfair Dismissal and Sexual Harassment. Protect your business today!



- Helps fulfil your legal obligations.
- A Step-by-step Questions & Answers format.
- Comes complete with over 70 policies, procedures and forms.
- Improve productivity and motivation amongst all employees.
- No expensive consulting, royalty or commission fees.
- Publish your manual in hard copy and on your network or intranet.

Policies Included
- Overtime Policy
- EEO
- Sexual Harassment
- Wages & Salary
- Sickness Benefits
- Maternity Leave
- Employment Conditions
- Annual Leave
- Anti-Discrimination
- Termination

WebSearch Code: MAU011

MAU011 $169

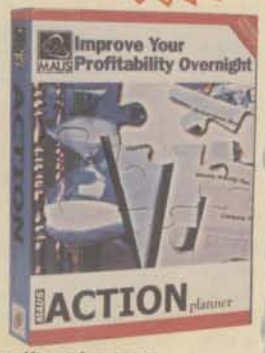
MAUS Action Planner

LINKS WITH MASTERPLAN

Invest in your most important asset...your employees!

Now it is easier than ever before to manage and motivate your employees.

MAUS Action Planner will ensure your employees have an Action Plan on their desk at the start of every week and month.



Key Benefits:
- Visual feedback of your staff's performance.
- Reports on key performance indicators.
- Sets weekly and monthly goals.
- Increased employee productivity.
- Prioritising of employee tasks.
- Employees involved in the planning process.
- Employees focused on the big picture.
- Accountability in managing projects.
- Implement your business plan effectively.

WebSearch Code:MAU012

MAU012 $169

Business & Marketing Plans

The Easy Way

MAUS MasterPlan is designed for people who need a winning, professional Business Plan instantly. A step-by-step question and answer format enables you to construct full financials, text and graphics at the click of a button. **MAUS** MasterPlan will allow you to analyse and develop your business.

Topics covered include Sales Analysis, Market Analysis, SWOT Analysis, Marketing Plan, Financial Plan, and much more. Australian written and tested in the field, this program has been tailored specifically to meet the needs of Australian users and is suitable for both product and service businesses in any industry. With **MAUS** MasterPlan, your Business Plans will be more effective, more impressive, and greatly improve your chance of achieving success!

Product Summary

MAUS MasterPlan - Level 2 (Professional): Software to help you prepare either a simple Business Plan or a more detailed Business Plan which incorporates a full Marketing Plan and analysis. Includes full financial analysis, a follow up program which doubles as a Time Management tool and a FREE Business Planning workbook. Suitable for loan applications, analysing and improving an existing business, launching new products, or starting a new business.

WebSearch Code: AUS501

Key Benefits

- Creates Business & Marketing Plans
- Suitable for business people of all levels
- Creates full financials & graphs
- Includes a simple step-by-step tutorial

WHAT THE PRESS ARE SAYING

"The brilliance of this system is that you're led through the entire process step by step... the results will be as good as anything a professional would have provided for you"
Your Computer Magazine

6/6 Overall
PC @uthority (January 1999)

Runs on Windows 3.1 or later

MAUS MasterPlan for Windows - Level 2 Professional
AUS501
$169

BUSINESS DEVELOPMENT

MAUS Consultant's Pack

Establish a Business Planning Consultancy

Used by 1000's of Accountants and Consultants, the **MAUS** Consultant's Pack will give you the forms, tools and know-how to establish a successful Business Planning Consultancy overnight. Includes information on setting up your consultancy service, promoting and costing your services, impressing your clients and a step-by-step guide for every assignment. Software contains over 80 pages of forms and management question checklists, overheads for training, sample proposals, press releases, advertisements and much more!

Used by 1000's of accountants and Consultants

Includes

- **MAUS** MasterPlan Professional Ver 6.0
- Consultant's Guide to Business Planning
- Special Consultancy Software
- Questionnaires for clients
- Training Manual

WebSearch Code: MAU003

MAU003
$469

MAUS Job Descriptions & Performance Review

WHAT THE PRESS ARE SAYING:

"Job Descriptions offers 3,500 professional descriptions and Performance Review gives a list to follow when judging staff performance."
Sydney Morning Herald (18th August 1998)

"...ideally designed to be used in conjunction with job interviews, HR planning and annual staff reviews"
The Age (25th August 1998)

"...simple, affordable, revolutionary"
Instore Magazine (September 1998)

6/6 Value for Money
PC @uthority (October 1998)

PC USERS BEST PRODUCTS OF 1998

SAVE $30

BUY BOTH AND SAVE
MAUS Job Descriptions & Performance Review
MAU006
$308

WebSearch Code: MAU006

MAUS Performance Review

For fast, effective employee appraisals!

Described by PC @uthority as "one of the first products any manager should load onto their PC", **MAUS** Performance Review will help you create accurate, personalised employee reviews in minutes!

Simply choose from the dozens of performance criteria such as initiative, leadership, problem solving ability, and sales skills.....to name just a few! Next, use the simple 1 - 5 grading system to rank your employees in each area.

MAUS Performance Review will then support your ratings with clear, effective text...

..It's that fast. It's that easy!

Key Benefits

- Save 50-90% of the time to write employee reviews
- Simple step-by-step approach
- Record ongoing problems and achievements
- Accurate, personalised reviews
- Clear, natural text flows

WebSearch Code: MAU004

MAU004
$169

MAUS Job Descriptions

Write job descriptions in minutes!

MAUS Job Descriptions will help you create clear, concise job descriptions in minutes!

Simply choose from the thousands of built-in jobs and edit or even combine duties from different jobs. Next, use the simple question and answer approach to address the physical and educational requirements, work environment, qualifications and supervisory responsibilities.

MAUS Job Descriptions will then take your answers and write a comprehensive job description that's fully customised to your organisation...

...It's that fast. It's that easy!

Key Benefits

- Create job descriptions in minutes
- Over 3,500 sample job descriptions to choose from
- Hire the right people
- Improve productivity
- Protect your organisation against unfair dismissal claims

WebSearch Code: MAU005

MAU005
$169

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10.00am 'til 3.00 pm (EST) Saturday

TERMS & CONDITIONS
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New Version 4 Dragon Range

Dragon Naturally Speaking Preferred Version 4

Top Features

- **HIGH ACCURACY** - PC Magazine reported Dragon Naturally Speaking "achieved 98 to 99% accuracy" in competitive testing!
- **VERY LARGE VOCABULARY** - A vocabulary of 250,000 terms and more than 160,000 active words assures that: What you say is what you get.
- **CONTROL YOUR DESKTOP** - Open applications from the Start menu, switch from one application to another, and give commands like "Start Internet Explorer" by voice.
- **MULTIPLE USER SUPPORT** - Different users can share the same program by creating and storing their voice files on the same computer.
- **FAST SETUP** - Learns your voice in just a few minutes so you can be up and running quickly!

- **BROAD COMPATIBILITY** - Dictate into virtually any Windows application, including Microsoft Word 97 & 2000, Corel WordPerfect 8 & 9, America Online, and Lotus Notes.
- **INTERNET-FRIENDLY** - Browse the Web and use hotlinks by voice, when using Microsoft Internet Explorer 4.0 & 5.0. Talk into chat rooms at up to 160 words per minute!

WebSearch Code: DRG009

DRG009 **$319**

DRG010	Naturally Speaking Essentials	$89
DRG008	Naturally Speaking Standard	$179

Dragon Naturally Speaking Mobile

Create text anywhere

Dragon Naturally Speaking Mobile is the complete speech recognition system for people on the move.

- Holds up to 40 mins of continuous speech on built in memory cards.
- An additional 80 mins can be stored on removable memory cards.
- Speak at up to 160 words per minute.
- File your recordings into folders for ease of use.

Don't Be Chained To Your PC. Talk To Your PC Anytime Anywhere.

Its so easy!!

Press 'Record' button and speak into the recorder's built-in microphone.

Select which recordings you want transferred to the PC.

Connect the recorder to your PC using the included cable.

Press 'Transcribe' and your recorded speech appears as the text on your screen and in your document.

WebSearch Code: DRG006

DRG006 **$629**

TQA - ISO 9001/2 Quality Assurance

Develop your own quality system quickly, easily and at low cost!

TQA Series 5

Saves you time and money with templates and samples of quality system documents. These can be customised using your choice of Windows word-processor (Microsoft Word 6.0, Word Perfect 6.0, Microsoft Works 3.0 and above). To make the process even easier, a comprehensive Guide Book explains the standards in plain English, and Tech Tips are provided on the use of all 3 word-processors ! New multimedia CD version includes over one hour of Training Presentations + a series of Case Studies on different industries.

FINALIST - BUSINESS SOFTWARE AWARDS '97 & '98

Features
- ✔Low price - only a fraction of consultant's fees
- ✔Covers all relevant clauses of ISO 9001/2
- ✔Works with your familiar word-processor
- ✔Work at your own pace

CD Format

(Professional licences and 3.5 Disk version also available)

SPECIAL OFFER BUY BOTH TOGETHER FOR $439 + FREE COPY OF ESSENTIAL BUSINESS FORMS FOR WORD TQA003 LIMITED OFFER WHILE STOCKS LAST

AUSTRALIAN MADE

WebSearch Code: TQA004

TQA004 **$339**

Manage your quality system without bulging filing cabinets

TQA Quality Manager

✔ ***Document & Data Control***

Master List To track important documents and data. Records display number, title, version & issue date. Links to leading Windows word processors to view documents. With network licence, documents may be distributed electronically. Also includes Copy Holders List, Revisions List & Deletions List.

✔ ***Internal Quality Audits***

Audit Schedule to plan your audit program, and identify outstanding audits. Generate Audit Reports online. Duplicate Schedule reproduces checklists and other details for future years. List Internal Auditors, their contact details, and audits.

✔ ***Nonconformances/Corrective Action***

Nonconformance List displays summary and outline of all reported nonconformances. Generate Nonconformance Reports online. Various Query facilities.

✔ ***Management Review***

Record Minutes of Meetings. Default agenda and facility to create custom agenda.

CD Format

Network licences also available

AUSTRALIAN MADE

WebSearch Code: TQA002

TQA002 **$419**

IBM025	IBM ViaVoice 98 Executive Upgrade	$139
IBM080	IBM ViaVoice 98 Executive	$239
MSS024	MS Project 98 Upgrade	$299
MSS023	MS Project 98	$739
MGF120	MicroGrafx iGrafx Process	$1769
VIA123	Learning MS Word 2000 (Intermediate)	$59
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VIA130	Learning MS Excel 2000 (Formulas & Functions)	$59
VIA131	Learning MS Excel 2000 (Macro's & Charts)	$59
VIA132	Learn MS Outlook 2000 (Advanced)	$59
VIA134	Learning PowerPoint 2000 (Advanced)	$59
VIA133	Teach Yourself Computer Training Basics	$89
VIA103	Teach Yourself PC Maintenance	$99
VIA126	Teach Yourself Internet Training	$59
VIA128	English Pro Learning System CD	$89
VIA129	Kids to Whiz Kids 4 CD-Pack	$75

MCSE NT4 Certificate

Interactive CD-ROM Tutorials

Essential if thinking of becoming a Microsoft Certified Systems Engineer NT4

This series of interesting and effective CD-ROM tutorial provides you with your own virtual classroom teacher along with hands-on tutoring covering all areas of NT4. Each CD is equivalent to 6-8 hours of instruction. This series of CD have been expertly designed to cover all essential areas of NT4 along with preparing you for becoming an MCSE. Just look at what each CD covers. Buy the complete course and save over $749.

Features

- Want to gain a valuable computer qualification?
- Essential qualification for most computer engineering job
- Each CD is equivalent to 6-8 hours of training
- Purchase the complete sets and SAVE

Course Units Sold Separately:

Exam 70-058, Implementing and Supporting Microsoft NT Networking Essentials:*

VIA057 NT4 Networking Essentials Vol 1 ..... $129
VIA058 NT4 Networking Essentials Vol 2 ..... $129

Exam 70-068, Implementing and Supporting Microsoft NT 4, Server in the Enterprise:*

VIA059 NT4 Enterprise Vol. 1 ..... $129
VIA060 NT4 Enterprise Vol. 2 ..... $129
VIA061 NT4 Enterprise Vol. 3 ..... $129
VIA062 NT4 Enterprise Vol. 4 ..... $129

Exam 70-067, Implementing and Supporting Microsoft NT Server 4:*

VIA063 NT4 Server Vol. 1 ..... $129
VIA064 NT4 Server Vol. 2 ..... $129
VIA065 NT4 Server Vol. 3 ..... $129

Exam 70-073, Implementing and Supporting Microsoft NT Workstation 4:*

VIA066 NT4 Workstation Vol. 1 ..... $129
VIA067 NT4 Workstation Vol. 2 ..... $129
VIA068 NT4 Workstation Vol. 3 ..... $129

ELECTIVES AVAILABLE!

VIA056
$799

WebSearch Code: VIA056

BUSINESS DEVELOPMENT

Microsoft Office 2000 Training

Work Smarter, Not Harder

Now that Microsoft Office 2000 has arrived, learn the tricks that will help you get the most out of this fantastic new office package. There are so many new features in Microsoft Office 2000 a comprehensive training package will ensure the sky is the limit for your productivity.

The training package has now increased to a fantastic 7 interactive programme set, featuring a vast range of tricks, shortcuts and powerful features. You can get the Office 2000 Training in either CD or video format, and covers Word 2000, Excel 2000, Access 2000, Windows 98, Outlook 2000, Powerpoint 2000 and Internet Explorer 5.

When time is money, save yourself a heap of cash - buy Microsoft Office 2000 Training!

NEW

Multimedia
VIA116
$99

Video
VIA117
$125

WebSearch Code: VIA116
WebSearch Code: VIA117

Stop Wasting Precious Study Time

When you are driving, working out or walking the dog audio tapes and CD's are available for all of the latest courses. Microsoft MCSE, CISCO CCNA, Novell CNA, we have them all. Whether you want to become a CNE or just expand your IT mind the AudioWhiz range of CDs and cassettes is the best way to learn. Repeated listening, will embed the material in your mind ready for instant recall. After a few days of listening to your tapes you will find as you are studying your other materials, that you are able to answer questions easier and know the material more thoroughly. International Software Warehouse stocks a full range of CDs and cassettes.

VIA135 MCSE Exam 70-058 Audio CD $34.95
VIA136 MCSE NT Server 4 Exam 70-067 2xCDs $64.95
VIA137 MCSE Server 4 Enterprise Exam 70-068 2xCDs $64.95
VIA138 MCSE NT Workstation 4 Exam 70-073 Cassette $24.95
VIA139 MCSE Windows 98 Exam 70-098 2xCDs $64.95
VIA140 MCSE Windows 98 Exam 70-098 Cassette $44.95
VIA141 MCSE Exchange Server 5.5 Exam 70-081 2xCDs $39.95
VIA142 MCSE Exchange Server 5.5 Exam 70-081 Cassette $29.95

Teach Yourself WordPerfect Office 2000

Get the most out of your software

Learn all the time savers of the new Corel WordPerfect Office 2000. This pack includes all the basics to get you up and running and more advanced features to help you work more efficiently. A complete set of 5 interactive multimedia CD tutorials in 1 package. Great training, great value.

Includes:

Teach Yourself WordPerfect 9
Teach Yourself Quattro Pro 9
Teach Yourself Corel Presentations 9
Teach Yourself CorelCENTRAL 9
Teach Yourself Dragon Naturally Speaking

VIA111
$99

WebSearch Code: VIA111

Teach Yourself Beyond Office 2000

A four in one training pack that covers all the Office 2000 non-core products. Learn how to add a contact in Outlook 2000, Scheduling, how to insert clipart into PhotoDraw 2000 and learn how to create custom colours in FrontPage 2000. Four great packages in one - great value.

Includes:

Teach Yourself PhotoDraw 2000
Teach Yourself Outlook 2000
Teach Yourself Publisher 2000
Teach Yourself FrontPage 2000

VIA110
$79

WebSearch Code: VIA110

Teach Yourself Web Page Publishing 2000

Learn all about HTML programming and get your information on the web faster and looking more professional. Learn to add backgrounds using FrontPage 2000, downloading an image using HTML, creating a web page with HTML code and shows how a HTML table created in Notepad converts to a web page.

Includes:

Teach Yourself FrontPage 2000
Learning HTML Vol 1
Learning HTML Vol 2
Learning HTML Vol 3

VIA119
$79

WebSearch Code: VIA119

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CREDIT ACCOUNTS:- Accounts may be opened for Govt. Depts, Education and selected incorporated businesses, subject to status. Initial order value to open accounts must be in excess of $500. Credit account orders are only accepted on official stationery by fax or post. Credit accounts must be paid strictly within 30 days, and we reserve the right to withdraw credit facilities.

WARRANTY AND RETURNS:- Only Australian sourced goods are supplied. Goods are not supplied on a trial basis, please check specification and compatibility with the manufacturer prior to purchasing. Although our staff can offer advice, they cannot confirm compatibility. In the case of faulty goods, please contact our customer service department who will make arrangements for replacement. Such arrangements may involve you dealing with the manufacturer directly. If, within 30 days of purchase, but before opening the product, you decide the product is unsuitable please call us to arrange a returns number. We will refund the cost of the item minus a 15% restocking fee. We cannot accept non-faulty opened software for return, under any circumstances. All returns must be authorised by us, and must be returned in suitable packaging, bearing our returns number on the outside.

Returns not complying with these terms will be refused. Where a manufacturer offers a money back guarantee, this will normally involve you sending the product back directly to the manufacturer, who will process the refund themselves.

PRICE PLEDGE:- Refers to Australian products available ex-stock. We will beat the advertised total cost (including delivery) subject to not selling below our cost price. We reserve the right not to beat prices or liquidated, end of line or OEM items, and will not match prices that have been printed incorrectly. The price pledge is only available at the time of ordering.

SPECIAL OFFERS AND FREE GIFTS:- All special offers are subject to availability, and may be in promotional packaging (packaging may refer to boxes, manuals, etc.) All photographs are for identification purposes only. Please remember to choose a free gift when ordering. If no gift is specified, none will be sent.

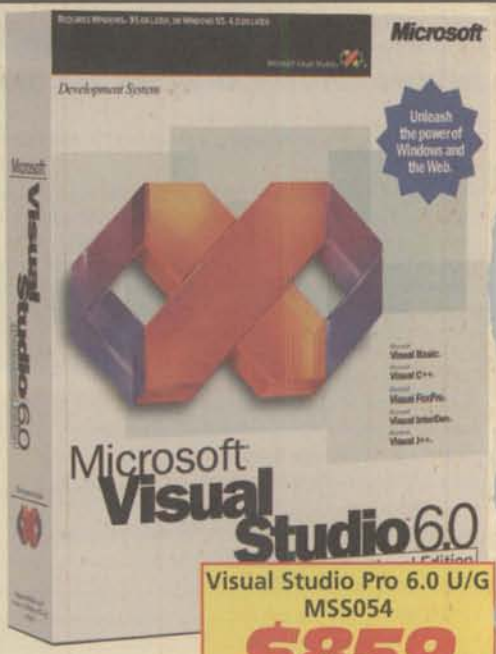
EXPRESS ORDERLINE 1300 300 003

Microsoft Visual Studio 6.0

Everything you need to quickly build Web- and Windows-based solutions for your developing world.

Microsoft Visual Studio 6.0 provides you with a complete tools suite to build and manage distributed solutions. Take advantage of RAD features to increase your productivity, integrate data seamlessly into your applications, and organize team-based development projects.

Product/Components	Description	Pro.	Ent.
Microsoft Visual Basic 6.0, Visual C++, Visual FoxPro 6.0, Visual InterDev 6.0, Visual J++ 6.0, MSDN Library Special Edition	The complete suite of Microsoft Visual Tools.	•	•
Enterprise Visual Database Tools	Visually design databases and views, and create and test stored procedures for Microsoft SQLServer 6.5+ and Oracle 7.0+ databases.		•
Microsoft BackOffice 4.5 Developer Edition (for Windows NT only)	Build Windows NT-based solution that can be accessed from Windows-based or Web-based clients and integrated in enterprise environment with selected server technologies form the Microsoft BackOffice family. The Development License for Microsoft BackOffice Server 4.5 includes Microsoft SQL Server, Microsoft Exchange, Microsoft SNA Server, Microsoft Site Server, Microsoft Systems Management Server and Windows NT Server.		•
Team Support	Microsoft Visual SourceSafe version control system version 6.0, Visual Component Manager, and Microsoft Repository.		•
Application Design Tools	Design multi-tier applications with Visual Modeler.		•



EDUCATIONAL pricing AVAILABLE

Visual Studio Pro 6.0 U/G
MSS054
$859

Visual Studio Pro 6.0
MSS053
$1699

WebSearch Code: MSS054
WebSearch Code: MSS053

Microsoft Visual Basic 6.0

Build powerful applications fast!

FROM $169

Microsoft Visual Basic 6.0 is the most productive tool for quickly creating fast business solutions.

With its Rapid Application Development (RAD) environment, developers can quickly create and deploy super-fast client/server applications - plus easily develop Web applications using familiar Visual Basic programming techniques.

Visual Basic is the leader in RAD with its visual user interface (UI) designer providing developers with intuitive drag-and-drop UI creation. No tool is more RAD, easier to design GUIs with, or has more commercially available third-party components, controls, and tools associated with it. Visual Basic has many pre-built components and fast creation of custom components that can be either client or server based.

With IntelliSense technology, you don't need to memorise commands or language syntax. Just type a portion of the word, and Visual Basic does the rest.

EDUCATIONAL pricing AVAILABLE

Visual Basic 6.0
Learning Edition
MSS057
$159

WebSearch Code: MSS057

Microsoft Visual C++ 6.0

Visual C++ 6.0 is the most productive C++ tool for optimised high-performance Windows and Internet development.

Nearly all contemporary world-class software, including the leading Web browsers, Internet servers, databases, and office productivity suites are built with the Microsoft Visual C++ development system.

It is also a tool of choice for creating scalable, multi-tier corporate applications where performance and reliability are critical.

FROM $169

Key Features

- For faster turnaround, make changes during your debugging session and continue on without rebuilding
- Speed development time and write less code with on-the-fly syntax and programming assistance within the editor
- Add a variable or method to a class, and its reflected immediately
- Realise up to a 30 percent faster compile time for quicker turnaround.

CALL FOR PRICING ON LEARNING EDITION

EDUCATIONAL pricing AVAILABLE

Visual C++ Standard 6.0
MSS062
$155

WebSearch Code: MSS062

MSS059	Microsoft Visual Basic Pro 6.0 Upgrade	$415
MSS058	Microsoft Visual Basic Pro 6.0	$799
MSS064	Microsoft Visual C++ Pro 6.0 Upgrade	$399
MSS063	Microsoft Visual C++ Pro 6.0	$829
MSS056	Microsoft Visual Studio Enterprise 6.0 Upgrade	$1699
MSS055	Microsoft Visual Studio Enterprise 6.0	$2575
MSS061	Microsoft Visual Basic Enterprise 6.0 Upgrade	$1159
MSS060	Microsoft Visual Basic Enterprise 6.0	$1975
MSS245	Microsoft FrontPage 2000 Upgrade	$85
MSS236	Microsoft FrontPage 2000	$169
MSS185	Microsoft Visual SourceSafe 6	$889
MSS195	Microsoft SQL Server 7 & 5 Clients	$2169
MIC493	Microsoft Win NT Server 4.0 & 10 Clients T/U	$679
MSS570	Microsoft Win NT Services for UNIX 1.0	$239
MSS234	Microsoft BackOffice Server 4.5 & 5 Clients	$4799
MIC761	Microsoft Plus! 98	$55

Microsoft Windows 98 Second Edition

Enhance your productivity and redefine your PC's possibilities using the Microsoft Windows 98 operation system. It provides full internet integration, optimal performance and support for the latest entertainment and accessory options.

Microsoft focused on advancing Windows 98 in the following areas with the release of Windows 98 Second Edition:

- Making it work better by enhancing hardware support and improving the initial PC user experience.
- Delivering home networking capabilities through Internet Connection Sharing, which enables multiple users to seamlessly and securely access the Web at the same time, using a single shared Internet connection.
- Delivering an improved online experience with Microsoft Internet Explorer 5 and Microsoft Windows NetMeeting conferencing software version 3, which provides users with a fast and easy way to use browsing and Internet conferencing software.

Key new features and enhancements:

- Internet Explorer 5, the new version of Microsoft's award-winning browser software, is included.
- Internet Connection Sharing enables multiple users to seamlessly and securely access the Web simultaneously via a shared Internet connection.
- NetMeeting conferencing software version 3, the new version of Microsoft's real-time collaboration and conferencing client, introduces a smarter user interface, data conferencing security, enhanced standards support and more.
- Advanced Configuration and Power Interface (ACPI) advancements deliver hardware optimisations and more granular control over settings on a device-class basis.
- Enhanced 1394 support supports key controller interface protocols.
- High-bandwidth modem support delivers driver support for leading ADSL modems.
- USB improvements include the capability to work with devices on a per-device rather than a per-port basis.
- WDM modem support supports USB modems and enables hardware vendors to write a single WDM modem driver for Windows 98 and Windows 2000 Professional.
- WebTV for Windows updates provide support for a broader array of tuner cards and help set the standard for the combination of high-bandwidth data and video.
- DirectX API 6.1 delivers a variety of improvements to Windows multimedia technologies, including better audio and video synchronisation.
- Processor and motherboard optimisations for the latest hardware technologies, including Intel Pentium III, are featured.
- Device Bay support enables a system to ship with Device Bay hardware.
- Windows 98 Service Pack 1 addresses issues with existing Windows 98 features and includes the Windows 98 year 2000 update and Internet Explorer 4.01 Service Pack 2.

Microsoft Windows 98 2nd Edition U/G
MIC771
ONLY
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WebSearch Code: MIC771

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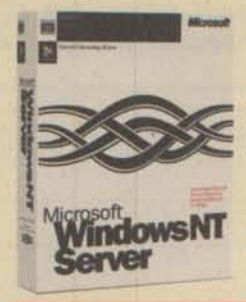

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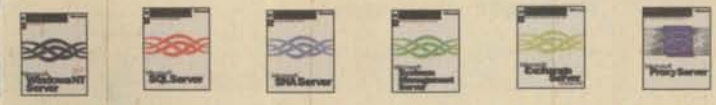

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Quick and painless guides to Office 2000, SPSS, palm programming and Y2K compliance.

Back to basics

Y2K: Lessons Learned from World-Class Companies

The cover says this book is an alternative to 'the doomsday hype offered by the current crap of Y2K pundits'. Sorry, that should read 'crop', not 'crap'. It's just very difficult to see the text against a dark background.

Cover aside, *Y2K: Lessons Learned from World-Class Companies* is a refreshing read. It is free of the increasingly silly business language — it doesn't say 'leverage your existing infrastructure' when it means 'use what you already have'. It provides genuine insight into Y2K for businesspeople, starting with some powerful and easily understood examples of how non-compliance affects calculations. The author gives one of the clearest explanations of Y2K ever written and clarifies what this means for every computer system.

Unfortunately for Australian readers, the next 50 pages describe Y2K status by industry in the US. Although there are plenty of parallels here, in many cases the information will only be of passing interest. Readers should obtain information from the Australian Bureau of Statistics (ABS) to get a local angle. The chapter on legal issues suffers from the same problem; it was written for the US legal system, but the scenarios are similar.

If you need guidance to implement a Y2K testing and repair program, you will find this advice helpful. It is punctuated with expert input from various industry experts (analysts, legal experts, Microsoft employees). Author Jim Cope has really done his homework by finding the right people for each situation. Insurance company Prudential has even contributed a document on how its successful internal Y2K program was devised.

That said, there are really only about 200 pages of actual advice in this book. The rest consists of a glossary and sample worksheets, plans and other documents taken from actual Y2K work situations.

Programmers and IT specialists will need more technical advice, but if you need to know exactly how and why a business should address Y2K, look no further. Despite its US focus, this book offers a dose of commonsense in the face of what Cope calls "the excessively negative approach" of the mass media.

Simon Vandore

Author	Jim Cope
Publisher	Que
Distributor	Pearson Education
Phone	(02) 9454 2222
Price	$39.95
ISBN	0-7897-1991-6
Rating	★★★★

SPSS Analysis without Anguish

SPSS — originally Statistical Package for the Social Sciences, but more recently Statistical Product and Service Solutions — has been a favourite statistical tool among social scientists since the mainframe days. Although an updated version of SPSS is currently available, this book only covers versions 7.0, 7.5 and 8.0 for Windows, which is made clear on the cover of the book.

Timeliness aside, the authors have done a good job. The material is presented in a logical order, starting with putting data into the program, ensuring statistical assumptions are met, and transforming data. The book has just one real flaw, in that the section about data importation assumes data is stored using fixed formats, while these days, it's more likely to be in comma or tab-delimited form.

No attempt is made to teach statistics, and readers are instead referred to appropriate texts. However, some of the discussions should jog the memory of those whose statistical knowledge is rusty.

Guide to ratings

★	Last thing on my mind
★★	That don't impress me much
★★★	It's not right but it's okay
★★★★	I want it that way
★★★★★	Hit me baby one more time

The examples are simple and describe a variety of realistic situations. There are basic descriptive statistics, various methods of analysis of variance, multiple discriminant analysis and cluster analysis.

The design is appropriately conservative. There are wide margins and plenty of relevant and meaningful screenshots and output samples. A reader could study it 'offline' and be well prepared to deal with the software. The wire binding is useful for the reader who wants to work through the examples on the computer because it allows the book to lie flat. Such readers are also catered for by the provision of sample data sets on an accompanying floppy disk.

Stephen Withers

Author	Sheridan J Coakes and Lyndall G Steed
Publisher	John Wiley and Sons
Distributor	John Wiley and Sons
Phone	(07) 3859 9755
Price	$43.95
ISBN	0-471-34080-4
Rating	★★★★

Microsoft Office 2000 for Windows

This book is not for the power user. Part of the Visual QuickStart series, *Microsoft Office 2000 for Windows* is definitely for beginners. It covers everything you need to know about using Office 2000 for all of your daily tasks. This book is essentially a printed version of an online tutorial. Although this may not sound like the most exciting of options, it is actually a very handy tome.

The most obvious advantage is that unlike Office 2000's own online tutorials or help files — which bog you down with details and then give you scant information — you can easily access exactly what you want.

The book is well organised. Its chapters cover the basics of each Office 2000 module — Excel, Word, Access, Outlook and PowerPoint. Each page is broken into two distinct columns. One lists which buttons you need to click and the options you need to choose, while the other features screenshots and graphics depicting the buttons and menus. This combination of concise descriptions and graphics makes the book extremely easy to use.

Microsoft Office 2000 for Windows doesn't claim to be a highly detailed guide on every aspect of Office 2000, so don't expect to find the answers to all of your questions in this book. However, it's a good place to start learning about the different uses and functions of Office 2000's various modules. It is a handy guide for the beginner.

Darren Ellis

Author	Steve Sagman
Publisher	Peachpit Press
Distributor	Pearson Education
Phone	(02) 9454 2222
Price	$24.95
ISBN	0-201-35440-3
Rating	★★★

Teach Yourself Palm Programming in 24 Hours

Any guide that claims to teach you an essential computing skill in the equivalent of a day clearly presumes a certain level of knowledge. *Teach Yourself Palm Programming in 24 Hours* is no exception. It offers thorough discussions of the PalmPilot hardware and operating system, and plenty of useful insights into how to adapt application development to the handheld environment — but you won't get too far without a solid knowledge of other IT concepts. Although a working knowledge of C programming isn't essential to get through the bulk of the text, a good understanding of database structure is a key requirement.

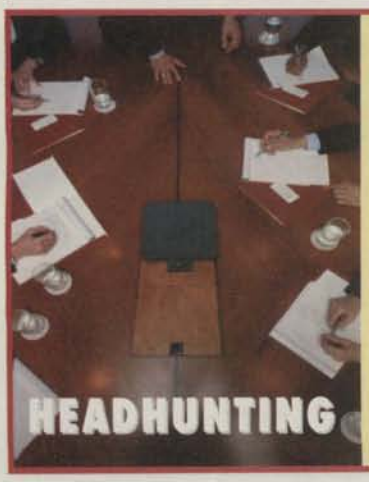
Within these limits, however, Sydney developer Gavin Maxwell deals with the subject admirably. The book is divided into four main areas centred around specific development tools: the detailed Palm discussion, which consumes the first five 'hours' of learning; the forms-and-database-centric Puma Satellite Forms and Pendragon Forms; CodeWarrior for C development; and CBasPad for Basic.

The majority of the text focuses on the forms applications. This is appropriate, because most custom applications for the Palm require data input which needs to be synchronised with existing corporate databases. Numerous code examples are backed up by chapter summaries, Q&A sections, and workshop quizzes and exercises for concept reinforcement.

As is typical of this genre, the book comes complete with a CD which features sample versions of the development applications discussed. Ultimately, learning Palm programming may take you a little longer than the prescribed 24 hours, but this is still a handy guide to take on the journey.

Angus Kidman

Author	Gavin Maxwell
Publisher	Sams Publishing
Distributor	Pearson Education
Phone	(02) 9454 2222
Price	$39.95
ISBN	0-672-31611-0
Rating	★★★☆



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Perspective: A philosophic approach

Making the Internet Work for Your Business

This book takes a pragmatic and realistic view of how small businesses can exploit the Internet. It reinforces the fact that a Web site is not a panacea. Rather, it is a powerful tool that is an integral part of a total sales and marketing strategy.

The title really should be 'making the Internet work for your small business', as this is the market at which the book is squarely aimed. Author Angela Booth assumes the reader has little or no prior knowledge of the power and potential of the Internet as a platform for selling products and services. She is very thorough and provides a framework for each topic. For example, in the chapter on marketing Booth devotes a few pages to the role of marketing in an offline strategy before discussing the business cycle on the Internet.

Readers are taken step-by-step through the establishment of a Web presence to help develop a business. The book covers everything from opening an account with an ISP to planning and creating a site as well as marketing, training and education. No stone is left unturned — there's even advice on how to determine if the domain name you have chosen is still available.

Booth includes comments from a range of people working in the industry, and draws on the experience of many small Australian business owners who have successfully established a Web site.

Internet jargon is clearly explained, so you'll understand that a cookie is an information gathering tool, not something you eat.

This book also provides useful references to a range of excellent resources, including Australian government education and training sites, financial and human resource sites, SOHO resources, and a swag of freebies.

Overall, *Making the Internet Work for Your Business* is an excellent read. It is extremely well targeted and provides appropriate background information and technical material for small business owners. It is also refreshing to read an all-Australian guide which draws on local case studies and expertise.

If only the word 'small' were in the title, this book may well have scored five out of five. Still, it's possibly the best $24.95 small business owners can spend.

Cathie Kennedy

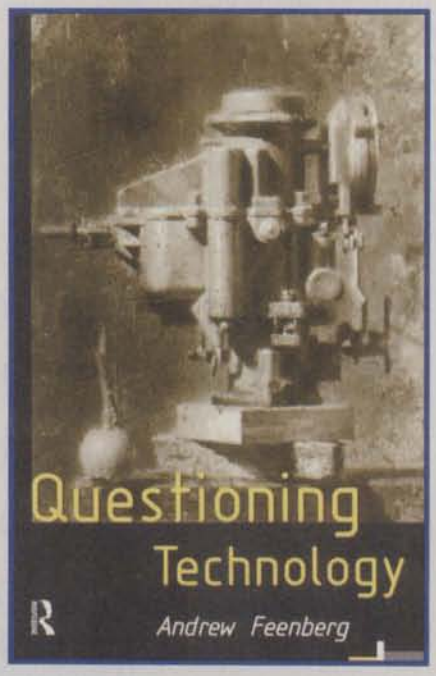
Author	Angela Booth
Publisher	Allen & Unwin
Distributor	Allen & Unwin
Phone	(02) 8425 0100
Price	$24.95
ISBN	1-86448-738-0
Rating	★★★★☆

Questioning Technology

Questioning Technology doesn't claim to be written for a lay audience. It's for keen followers of philosophical debates and assumes familiarity with the works of Heidegger, Marcuse, Ellul and Foucault.

Like many philosophical texts, it often uses complex sentences when simple ones would do. For example, "The reaction against determinism brought the contingency of technological development into focus, which in turn has opened the way to a reassertion of the political", simply means that philosophers are currently interested in the political consequences of technological change.

Feenberg argues for a democratic approach to the philosophy of technology, which recognises that technology can be reconstructed to play different roles in different societies. In this way, he agrees with constructivist philosophers such as Marcuse and Foucault, who see technology as a social process.



Feenberg contrasts his perspective with essentialism, which he claims has been the dominant paradigm of technology philosophers this century. Essentialists view technology as an abstract, unchanging force which is outside of human control. However, they disagree about whether technological change is positive or negative — is it fundamental to human progress or is it dehumanising? If you take the position that technology is outside of human control, then you must also accept that the social and environmental effects of technology cannot be changed through political action.

Feenberg's ideas are clearest in part one, where he discusses the French student uprising of May 1968. Students occupied universities to protest against the increasing integration of universities and industry, and demanded that students have a say in university management. The students were later supported by a general strike of millions of French workers and public servants, who also demanded self-management of factories and their workplaces.

These events occurred about 30 years ago, so it is unusual that Feenberg chose them to bring the philosophy of technology up-to-date. There are more recent examples of public debates about technology. Other academic disciplines, such as science and technology studies or cultural studies, are better able to keep up with the current debates about the social and environmental effects of technologies and in turn influence those debates. *Questioning Technology*, however, is recommended for anyone interested in a democratic approach to the philosophy of technology.

Glenn Phillips

Author	Andrew Feenberg
Publisher	Routledge
Distributor	Jacaranda Wiley
Phone	(02) 9805 1100
Price	$42.95
ISBN	0-415-19755-4
Rating	★★★

Commemorate the centenary of Federation, bone up on history, create an employee manual or have fun with the kids.

History never repeats

Federation of a Nation

Federation of a Nation provides a handy explanation of how Australia's current political system was founded, and is especially valuable in light of the current republic debate. The CD is designed for families and schools, but it is a useful reference for anyone considering their vote in the forthcoming referendum.

Federation of a Nation makes effective use of the familiar face of Henry Parkes as its narrator. The content is presented in chapters which cover the events leading up to Federation, Australia's founding fathers, arguments against Federation, the creation of the constitution and post-Federation milestones.

The CD also includes a treasure trove of photographs, paintings, drawings and video footage, including footage of the signing ceremony in Sydney's Centennial Park and an introduction by Prime Minister John Howard.

A section of Federation of a Nation is devoted to the republic debate. Viewers can compare the cases for and against a republic argued by republican Malcolm Turnbull and monarchist Kerry Jones. The CD explains how the referendum and election processes work, based on information supplied by the Australian Electoral Commission.

You can create 'projects' or scrapbooks of information on a variety of topics. There are teaching notes for classrooms and it is ideal for school projects.

The period since Federation has not been without its problems, most notably the continued suffering of indigineous people and other minority groups. That this CD does not deal with these issues in any detail is disappointing. The inclusion of some incorrect dates also detracts from the CD. Nevertheless, Federation of a Nation is a compelling and timely overview of the history of the Commonwealth of Australia.

William Maher

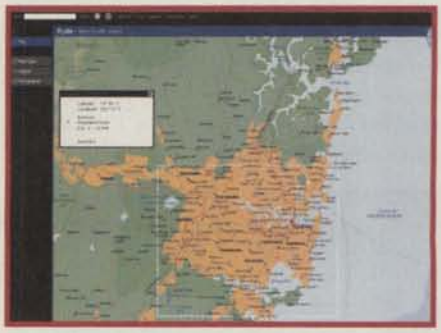
Publisher	Webster Publishing
Distributor	Scholastic New Media
Phone	(02) 4328 3555
Price	$49.95
Requires	Pentium, Windows 95, 16M RAM, 2x CD-ROM drive
Rating	★★★

Microsoft Encarta DVD-ROM Reference Suite 99

The Encarta DVD-ROM Reference Suite 99 comprises three different products — the Encarta Encyclopedia Deluxe 99 is the core resource, which is accompanied by Virtual Globe 99 and Bookshelf 99.

The Encarta Encyclopedia component of the DVD is simply its annual update. If you have previous versions, the most you can expect is additional articles and media clips. The latest update also incorporates new features such as quick facts and natural language searches — nothing to make owners of Encarta 98 rush out to buy it.

For those not familiar with Encarta, it is a very fine encyclopedia, with a large number of articles and media clips, excellent navigation and a number of 'virtual tours' through topics. Its interactive tools are some of the best, with the ability to explore topics with pivot tables and learning dialogues. It also includes 360° images, literary extracts, a



learning game for children called Mind Maze and a dictionary.

Bookshelf 99 gives quick access to information such as lists of quotes and their origins, synonyms for words and French, German and English translations. It is a handy but basic reference tool.

The Atlas is technologically the most impressive of the products on the DVD. Starting with a globe, it allows you to zoom in to extraordinary detail — down to the suburbs and street names of major cities. It also links facts and images related to the places on screen. Maps can be viewed according to weather conditions, topography and population.

Finally, there's the Research Organiser, designed for gathering references to resources, which would be useful for project development.

If you have a DVD-ROM drive and don't already have a multimedia encyclopedia, get this one. It's neat, concise and has some very cool features.

Nathan Taylor

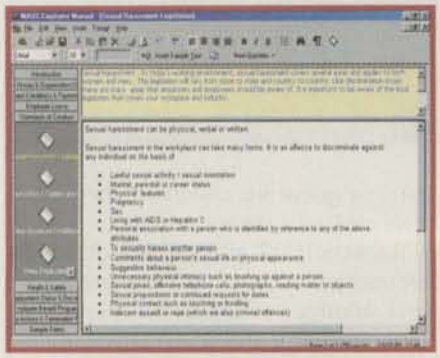
Publisher	Microsoft
Distributor	Microsoft
Phone	13 20 58
Price	$199
Requires	Pentium, Windows 95/98/NT, DVD-ROM drive, 16M RAM
Rating	★★★★☆

Maus Employee Manual

A program to help SMEs create employee manuals sounds like a good idea, but this one provides no specific guidance for particular industries, nor does it provide information on the variations in relevant legislation. The package is also full of typographical errors.

Most of the manual accompanying the software is given over to a sample annotated employee manual, while the information about installation and use is relegated to an appendix.

The user interface is multipaned, which some users may find daunting. An outliner-style interface might have been more appropriate and familiar. Switching between topics — whether or not the 'load entire manual into memory' option was selected — was not as snappy it could be. Surprisingly, there is no indication that a



section of the manual has been completed unless you are working in the 'advanced menu' (which is really more of a view than a menu).

It may have been better if Maus had skipped the development effort involved in creating a program and simply shipped a Microsoft Word template containing the sample text and notes (at a budget price).

Stephen Withers

Publisher	Maus
Distributor	Maus
Phone	1800 350 013
Price	$199
Requires	Pentium, Windows 95/NT, 16M RAM, 30M hard disk space, CD-ROM drive
Rating	★☆

Crocadoo: Gone Troppo

This title is based on the Australian kids TV show *Crocadoo*. Consequently, it won't instil US accents in your young 'uns.

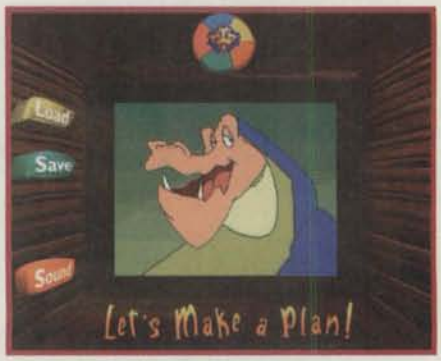
Its humour has a definite larrikin streak which is refreshing. Parents will laugh along at the exploits of Brian and Jazz the crocodiles as they attempt to fight off the invasion of the Wongleback beetles.

The format for Crocadoo is familiar: watch a cartoon exposition of the plot, then play a subgame in order to move on. 'Gone troppo' refers to Brian's attitude meter, which you need to adjust in order to be able to talk to characters in the game. In fact, you often find yourself switching attitudes and clicking on characters until something works.

This is symptomatic of a more general problem in Crocadoo. The animated sequences are great, and generally a little longer than comparable titles, but the subgame sections are poorly developed and short on interaction.

The maze subgame is a case in point. It quickly becomes just plain annoying when you die over and over again. Even adults will quickly become frustrated. Fortunately, in the Wongleback crushing game you can cheat and freeze all the hyperactive beetles, which allows the plot to continue.

It's a real pity that the interactive sections are so weak, because the animation and voices are excellent. There are some humorous moments, such as a flock of bats flying into the moon, which shatters. If a little more thought had been put into the interactive sections, Crocadoo: Gone Troppo would be a



standout title instead of being worthwhile only to *Crocadoo* addicts.

Dorothy McShane

Publisher	Dataworks
Distributor	Dataworks
Phone	(03) 9764 8344
Price	$29.95
Requires	Pentium 90, 16M RAM, 4x CD-ROM drive; PowerPC, System 7.5.3
Rating	★★

Interactive News

- Toshiba is about to release a new media drive, the first unit to combine two of the hottest storage technologies, DVD-ROM and CD-RW (CD-Rewritable). Rather than waiting for mass manufacture of DVD-RAM technology and consumer-friendly prices, Toshiba has opted to integrate CD-RW technology with DVD capabilities. This is because, according to Toshiba's president of strategic marketing, John Freeman, "CD-RW and DVD-ROM are poised to be two of the fastest growing technologies over the next few years".
- DVD-ROM drives in PCs are nothing new now, but when consumers are faced with the choice of a DVD-ROM drive or a standard CD-ROM drive, the CD-ROM has triumphed. After all, there are very few games available in DVD format, and DVD movies — their main selling point — look pretty silly on a 15in screen. X10 has produced a kit called DVD Anywhere to address these problems. The kit comes with wireless transponders to send the audio and video signal between your PC and TV at a distance of up to 30m, and comes with a wireless remote to control the movie playback. See http://www.x10.com/ for more information.
- Intel has recently announced a change in its digital TV decoder plans. DTV is yet to be launched in Australia, but the new standard has recently been launched in the US, and Intel sees the development of all-in-one TV/PC systems as an important part of its long-term strategy. Intel had licensed a software DTV decoder from Hitachi, but it's now considering licensing software from Ravisent Technologies, a digital audio and video software developer. The expected release is now mid-2000, which may be a blessing in disguise for Intel. Current software DTV decoders struggle on the latest cutting-edge processors, using all the CPU's processing power, but the mid-2000 release date allows more time to tweak the software, and more processing power will be available in CPUs by that time. However, a number of other companies are finetuning DTV-decoding hardware to be used as an add-on card for PCs, and they are likely to be firmly established by the time Intel releases its software solution.

Gareth Jones

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Cloak and dagger

Kingpin: Life of Crime

A first-person shooter set in the seedy world of organised crime, Kingpin is as notable for the controversy surrounding its release in both the US and Australia as it is for being a good game. It features excessive violence and even more excessive swearing, so it's certainly not suitable for children, even with its 'low violence' install option. That said, and in spite of all the disclaimers and warnings on the box, it's not significantly more violent than any other game in the genre.

Despite all the hype, this game is basically another Quake clone (it is, in fact, based on the Quake II engine). Sure, there's a little dialogue, some semblance of a plot and a basic inventory system, but the ultimate aim of the game is to blow away lots of bad guys — or lots of human opponents in multiplayer mode.

Consequently, the game is a little tired from the outset. It lacks the style and brilliant scripting of games like Half-Life, although some scripting is evident, and there are frequent battles between rival gangs. You can gain followers and give them basic instructions, buy equipment in shops (which are nearly always out of the stuff you want) and enter bars. The weapons are typical of the gangland milieu, and the enemies are differentiated only by their look and their guns.

The game is quite difficult, even on the easier settings. The artificial intelligence is more impressive than many games in the genre, although it often fell into that category of computer cheating — the enemies are unnaturally tough and almost never miss.

All up, it's not a bad first-person shooter, featuring well-designed environments, great textures and a lot of character, but it has all been done before.

Nathan Taylor

Distributor	Dataflow
Phone	(02) 9417 9700
Online	http://www.interplay.com/kingpin/
Price	$89.95
Requires	Pentium II 233MHz, 64M RAM, 570M hard disk space, 4x CD-ROM drive, 3D accelerator
Classification	MA(15+)
Rating	★★★

Hidden & Dangerous

I thought this would be the 3D game to pull me away from EverQuest. Playing the demo version, in which a team of WW II commandos must be controlled to capture an enemy rail bridge during a storm, convinced me Hidden & Dangerous would be a classic. That's the opening mission in the full game and it still blows me away.

Level design is consistently superb throughout this strategy/action simulation, which is in the same genre as Delta Force, Spec Ops and Rainbow Six. These games are the antiQuake — players cannot simply run around blasting everything in sight, because the level of realism is such that one shot can kill a character. Tactical planning is the key.

Hidden & Dangerous oozes atmosphere and authenticity, from the dramatic music to the detailed inventory carried by your soldiers. You control a large group of commandos carrying out missions behind enemy lines, each conducted by a team of four selected for their skills. Lose one member and you will miss him — lose several and your task will become significantly harder.

The big flaw with this game is the graphics code. Slightly dodgy graphics and animations don't bother me, but this game suffers from severe clipping problems — one moment a soldier is standing on the edge of a tower, and the next he has fallen to his death when the game suddenly changes its mind about

how close he is to the edge. A soldier can be hidden behind a door, when suddenly his face and rifle poke *through* the wood, exposing him to enemy fire and instant death. Dying this way after struggling through a difficult mission is incredibly frustrating. I found myself saving a great deal, and being very annoyed by having to proceed through various menu screens when I wanted to reload (a Quake-style quicksave would be handy). For these reasons, I am still well and truly entrenched in EverQuest.

Hidden & Dangerous can be difficult to play. If the mission briefing says "you must have soldiers in position to storm a building after their team members create a distraction outside", you'd better believe it or everyone will end up dead. Players who want to rush through the early missions will eventually hit trouble. Everything you do requires serious forethought and slow progress.

But this is what makes the multiplayer game so impressive. Play this game with some like-minded friends and you'll be able to make one character your specialty, whether it's the heavy machine gunner who provides covering fire, a sniper or an explosives expert. Tactical 3D gaming has never been so good.

Simon Vandore

Distributor	Jack of All Games
Phone	(02) 9482 3455
Online	http://www.talonsoft.com/hidden_dangerous/
Price	$89.95
Requires	Pentium 200, Windows 95, 32M RAM, 3D accelerator, DirectX 6.1
Classification	M(15+)
Rating	★★★★

Games News

● Electronic Arts (EA) has moved its inhouse testing facility from Sydney to sunny Brisbane, Qld. Not really all that newsworthy by itself, but they've also managed to snag LucasArts' former executive Steve Dauterman (whose last projects at LucasArts were the Star Wars: Episode 1 games) to head up the enterprise. It has announced that the new facility will be used not only to test EA games, but also to develop and maintain its stable of Australian-specific sports titles like AFL, cricket and rugby. Great news!

● The release of the sequel to Cavedog Entertainment's real time strategy (RTS) blockbuster, Total Annihilation, was very heavily anticipated among the gaming masses. Total Annihilation: Kingdoms was to be the next step in the evolution of RTS games, but it hasn't really turned out that way (see review on this page). Upon release, the gaming press was unified with the public in their disappointment with the game — it wasn't terrible, just not quite as brilliant as we'd all hoped. There was also a slight problem with the much-vaunted 3D-acceleration and 3D-rendered units which make this game unplayably slow. Cavedog acknowledged this problem in a recent statement, saying that the problem lies with Microsoft's DirectX 6.1 and its inability to manage the amount of textures in the game. Are we supposed to believe that nobody at Cavedog noticed this before the game was released? Come on! However, they were nice enough to offer a solution to the 3D-acceleration problems — run the game in software mode until Microsoft updates DirectX. Gee, thanks a lot guys!

● Oh, dear God! Just when you thought it couldn't get any better, the . . . er . . . 'developers' at WizardWorks (yep, the people responsible for Deer Hunter) have come up with an idea for its next smash-hit title. Bartending. I'll say that again. Bartending. Entitled 'Last Call', the game will be the world's first bartender simulator, requiring you to mix over 70 drinks, check the ID of young-looking patrons, change kegs and do an assortment of other riveting bar-type stuff. It's due for release around Christmas this year. Ever have one of those times when someone tells you something so dumb that you desperately try to believe you're just having a bad dream? Yeah, me too.

Gamespy

Heavy Gear II

Heavy Gear II could almost be subtitled 'We definitely don't have the MechWarrior licence anymore' — a result of Activision's entry into the MechWarrior-dominated large robot game category.

You control a 'Mech' (cough) sorry, a 'Gear', in a variety of combat missions. Initially these are solo missions, but eventually you'll act as part of a coordinated attack squadron. Heavy Gear II deviates from the norm in that it's actually quite fast. The average mech-style game involves huge clanking behemoths, carefully planning devastating but slow attacks. Heavy Gear's theory is that if we're bright enough to build huge mobile suits, then we can stick wheels onto the legs for greater mobility. This switches the game from primarily strategy-based to primarily action-based. Careful planning is still required, but this is more a respite from the blasting.

Graphically, Heavy Gear is quite attractive: thunderclouds release torrents of rain and reduce visibility, huge Gears crunch through the snow, and while most levels are carefully structured to a limited territory, this is generally done fairly invisibly. In any case, you're too busy trying to survive to worry about what lies over a distant hill. Control, which can be adjusted for a variety of controllers and keyboard combos, is fairly easy. Deathmatch is supported over networks in a variety of preconfigured arenas. It's also possible to test your skill against computer-controlled Gears, although these aren't always that bright. Heavy Gear II is a nice complement to the more strategy-intensive Mech-style games. It comes highly recommended.

Alex Kidman

Distributor	Dataflow
Phone	(02) 9417 9700
Online	http://www4.activision .com/games/heavygearii/
Price	$89.95
Requires	Pentium 166, 64M RAM, 450M hard disk space, 4x CD-ROM drive, 3D accelerator
Classification	G(8+)
Rating	★★★★

Total Annihilation: Kingdoms

The title may be Total Annihilation and it may be a real time strategy game, but it has little to do with its futuristic predecessor. For a start, Kingdoms is set squarely in the fantasy realm — dragons, zombies, magic and evil wizards. It is also broader in scope. There are four competing forces, each with different buildings and units. These differences are not as great as they are in Starcraft, for example, but are certainly enough to require different strategies for each side.

One criticism of the original Total Annihilation is that the single-player element is not very good. Cavedog has taken this onboard and developed an expansive story-line that follows the rivalry between four sibling monarchs and their fight for dominance over the land of Darien. Unusually for the genre, the missions switch between the four protagonists as the story unfolds — one minute you are the noble Elsin, the next

you're the evil necromancer Lokken. This is a great idea. It draws you into the plot and, because of its progressive difficulty, you don't see the best units until late in the game; a strong incentive to keep going.

Multiplayer is smoothly implemented and free gaming is provided on Cavedog's Boneyards servers. In the end, this is where most players will spend their time, and you can expect excellent replayability as new units and maps are released for download. But the game isn't perfect. The 3D terrain is nicely rendered, but the units themselves are quite blocky and difficult to distinguish at times. This is compounded by a lack of adequate tools for unit selection.

Total Annihilation: Kingdoms is also resource hungry — you'll need a lot more than the minimum hardware requirements to keep the bigger missions from turning into a slideshow.

Jon Gill

Distributor	GT Interactive
Phone	(02) 9902 3000
Online	http://www.cavedog.com/ta-kingdoms/
Price	$89.95
Requires	Pentium 233, Windows 95/98, 32M RAM, 80M hard disk space, 4x CD-ROM drive
Classification	G(8+)
Rating	★★★☆

Sega Rally 2

It's been some time since Sega Rally was released for the PC, and there's been a number of rally-themed, arcade racers for the PC since then. However, Sega is re-entering the fray with the originally titled Sega Rally 2. Does it stack up?

Well, yes. It doesn't pretend to be an in-depth rally simulation, but carries its graphics as though it is. The advantage of this approach is that you can throw your car around corners and make it look as though you really know what you're doing. This is not to say that control is easy — it will still take time to master it — just that if it were a totally accurate simulation, you'd be crashing into everything in sight moments after revving away from the starting line.

Sega Rally 2 is fabulous to watch. It hurtles along at breakneck speed even on a low-end 3D graphics card. Snow falls, rain pelts down at the correct angle to your car and relative to your speed, and spectators throw themselves out of the way of your car if you slide a little too close to the side of the tracks. The usual multiplayer options are thrown in, as well as a '10-year' career mode for single play.

There can be a real problem with translating a perfectly good arcade machine for the home market. What looks great and plays well for $2 a throw just might not captivate for $70 worth of CD-ROM. Not so here. Sega Rally 2 is enough fun and has enough longevity through its 16 tracks and multiplayer options to justify its purchase.

Dorothy McShane

Distributor	Ozisoft
Phone	(02) 9317 0000
Online	http://www.segarally.com/
Price	$69.95
Requires	Pentium 200, 32M RAM, 90M hard disk space, 4x CD-ROM drive, Direct3D compatible graphics card
Classification	G
Rating	★★★☆

Outcast

Torn between a combat-focused third-person shooter and an adventure game, Outcast ends up excelling at neither — although it is a decent hybrid, overall.

You play Cutter Slade, a soldier sent through an interdimensional portal that some wacky scientists managed to open but are unable to close. You have to find the equipment to close the portal — but that's only the beginning of the saga. The inhabitants of the other dimension seem to think you are a saviour and ask you to save them from their evil ruler.

The game takes a third-person, over-the-shoulder perspective as you explore this new world. In-game cut-scenes move the camera around occasionally and there's

plenty of interaction with the inhabitants of the world's six regions.

For a software engine, the graphics in Outcast are quite impressive, but it's the artificial intelligence that really stands out. Not the combat artificial intelligence, but the flow of life that gives the impression of a real, organic world. In villages, characters move around, undertaking various chores. Farmers till fields, and mounts (which you can later ride) graze serenely. When you talk to characters, there is some well-rendered lip-synchronisation, which is very impressive and lends a great atmosphere to the game.

The game falls down a bit when it comes to combat. Often I found myself fighting with the interface while struggling to battle four or five aliens. Forget about doing anything clever — the battles end up being mostly mechanical. There are a number of weapons (standard first-person shooter fare), and each can be upgraded several times. A number of other objects can also be attained, from devices that provide invisibility to explosives and binoculars.

In the end, the game left a feeling of ambivalence — it has a lot of potential and some really good aspects, but it fell down in some key areas. A tighter storyline, 3D acceleration and a polished interface would improve this game a lot. Still, it is definitely a good buy for those in the market for something a bit different.

Nathan Taylor

Distributor	Ozisoft
Phone	(02) 9317 0000
Online	http://www.outcast-game.com/
Price	$89.95
Requires	Pentium 200MHz, 32M RAM, 500M hard disk space, 4x CD-ROM drive
Classification	MA(15+)
Rating	★★★☆

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Lost for words? Try a cliché, phrase or quote finder.
By Glenn Phillips

Used and abused

Cliché Finder

Clichés should be avoided like the plague. They crop up all too often in the written word, but they aren't about to go away any time soon. Although clichés are often attributed to lazy journalism, many writers think there is a time and a place for them, especially as a convenient cure for writer's block. Opinion on the matter is divided.

The word 'cliché', so the story goes, comes from the French word for stereotype, and refers to the days of movable typeface printing when often-used phrases were set up and kept ready for reuse. In the digital age, however, typesetting is a forgotten craft and in the interest of an economy of keystrokes clichés have been abbreviated to BTW, IMHO and ROTFLOL.

The Cliché Finder's main feature is its user-friendly search function. If you type in a word such as 'dog', you get a list of clichés featuring that word, such as 'you can't teach an old dog new tricks', 'work like a dog' and 'every dog has its day'. One limitation, however, is that it will not return any clichés for slight variations on the keyword, such as 'dogs' or 'dogged'. Because the site is US-based, Australian clichés are as rare as hen's teeth and there are more than a handful of unusual Americanisms, such as 'like talking a dog off a meat wagon' or 'busier than a ten-peckered dog in a hydrant factory'.

You can suggest additional clichés to the site's administrator, arts graduate S Morgan Friedmann. Friedmann defines a cliché as "a metaphor characterized by its overuse", and will only include those familiar to him in the database. So, if you suggest any obscure ockerisms, such as 'all over the place like a mad dog's breakfast', you may be told to pull your head in. Friedmann's definition is subjective, and some of the included 'clichés' would be better termed colloquialisms.

Another feature is Ten Random Clichés, which presents you with 10 of the 2,000 clichés in the site's database. Unlike other 'random' lists on the Web, a new list is produced each time. And of course, there are the obligatory links to other cliché sites. It may be nothing to write home about and there is some room for improvement, but Cliché Finder will keep you coming back time and time again.

Online http://www.westegg.com/cliche/

Rating ★★★★

Phrase Finder

Everyone should know that the phrase 'not enough room to swing a cat' refers to a cat-o'-nine-tails and not to a pussycat and its nine lives, but do you know what 'letting the cat out of the bag' means? According to the Phrase Finder, it refers to "a favourite country trick used to be to substitute a cat for a pig at markets. If you let the cat out of the bag you disclosed the trick — and avoided buying a pig in a poke".

The Phrase Finder is not only a great resource for checking the wording of 5,000 common phrases, it also gives the origin and meaning of many of them. The site is hosted on a server at the Sheffield Hallam University in the UK, but it does not indicate who maintains it, and therefore the information on the site should be taken with a grain of salt. 'Grain of salt' apparently comes from the Roman herbalist Pliny the Elder, who "translated an ancient antidote for poison with the words 'be taken fasting, plus a grain of salt'."

Although UK-based, it has more in common with Australian English than the Cliché Finder. There are two main ways to use Phrase Finder. You can browse through the A to Z lists of phrases, which can produce some very long phrase lists. Alternatively, you can use the search function, which acts as a "phrase thesaurus" and returns a list of phrases including the search item and other related words. This useful function opens up new possibilities, although some of the phrases have a distant relationship with the original search term. Searching for phrases about cats also brings up 'Tom, Dick and Harry' and 'tom foolery'.

Other features include a discussion forum, lists of Shakespearian phrases, rhyming slang, phrases which begin with 'as . . . as a' or 'like a . . .', explanations of popular fallacies about the origin of phrases, and mondegreens.

Mondegreens are misheard lyrics. The term was coined by Sylvia Wright after mishearing the lyrics of a Scottish folk song. Wright heard 'they have slain the Earl of Morray and laid him on the green' as 'the Earl of Morray and Lady Mondegreen'. However, there are only six mondegreens on the site, including 'excuse me while I kiss this guy' (excuse me while I kiss the sky) and 'the ants are my friends' (the answer my friends). Sites such as kissthisguy.com have far more extensive collections. One obvious omission is Australia's best-known mondegreen, 'Who's gonna shave me/Please make me smooth and even',

(Who's gonna save me, I pray for sense and reason), from Midnight Oil's 'Blue Sky Mining'.

Online http://www.shu.ac.uk/web-admin/phrases/

Rating ★★★

IMDb: Quotes Browser

Fans of *Casablanca* will have noticed that in our September issue, *APC* made the common mistake of misquoting the film. The words "Play it again Sam" were used as a heading in the music feature. Although Humphrey Bogart never actually said those words, they have taken on a life of their own, becoming the most famous misquote from a film. In fact, *APC* would like to coin a new word, 'againsam', to describe misheard film lines.

The Internet Movie Database (IMDb) Quotes Browser is a Web site where you can check your movie quote facts. You can browse alphabetically by movie title or perform searches. Searching the word 'play' was a big mistake, as it returned 100 movie quotes with variations on the word play, and none of them were from *Casablanca*. However, a search on 'play it' placed the famous lines third in a long list of quotes. Browsing quotes by film title is a little easier, but slow. If you click on *Casablanca*, it takes you to a page with many other quotes from the film.

For the record, the actual spoken words are "You played it for her, you can play it for me! . . . If she can stand it, I can! Play it!" IMDb also links to external sites which have sound files from the film, although the only linked site was down when Web File tried to access it.

The site has yet to catch up with the current trend of films borrowing lines, images and scenes from earlier films. For example, if you search for 'answer the question', it correctly finds dialogue from *The Breakfast Club*. However, it does not find the same dialogue when it is repeated in the more recent film *Go*, in a scene where one character, Todd, teases Claire by asking if she's a virgin. Claire replies, "Oh right, *Breakfast Club*."

The Quotes Browser itself is difficult to find, as it is hidden away in IMDb and takes several clicks to get to it from the front page. It's worth it when you get there though, especially if you are trying to find a quote but can't remember what film it is from. If you know the film, however, it's easier to go directly to the page dedicated to the film, and then follow the Memorable Quotes link and take a stroll down memory lane.

Online http://us.imdb.com/Sections/Quotes/

Rating ★★★

Surfbaud: Automatic writing

Astronomer Arthur Eddington once claimed that a million monkeys at a million typewriters would eventually produce the complete works of Shakespeare. Of course, Eddington, who also claimed to have calculated the exact number of protons and electrons in the universe, was never able to test his theory. More recently, information scientist Robert Wilensky has replied that "thanks to the Internet, we know this is not true". Are there any artificially intelligent Internet sites that will generate, if not Shakespeare, then at least readable text?

The Postmodernism Generator Web site is both a demonstration of what it calls "recursive grammar", and a parody of some academic writing genres. 'Neoconceptual narratives', by Wilhelm Tilton, is one such essay randomly created by the site. The essay includes subheadings and references, and strings together names, big words and complex phrases to form complete but meaningless sentences. For example, "the main theme of the works of Spelling is the paradigm of structuralist reality. The ground/figure distinction depicted in *Melrose Place* emerges again in *Beverly Hills 90210*. Thus, Foucault uses the term 'capitalist socialism' to denote the role of the writer as reader."

While the Postmodernism Generator is a cute gimmick, it takes on a darker meaning following the Sokal affair. In 1996, physicist Alan Sokal published the article 'Transgressing the Boundaries: Towards a transformative hermeneutics of quantum gravity' in the journal *Social Text*. A political critique of physics, it argued in favour of a "postmodern quantum science". Sokal later revealed it to be a hoax aimed at proving that left-wing academics had embraced obscurantism over critical thinking. Although Sokal wrote the paper himself, the Postmodern Generator is now linked with approval from his Web site.

We don't know if Sokal found his inspiration in the songs of Alanis Morissette, but he could now write his own angsty songs using the Alanis Morissette Lyric Generator. If you enter one thing you hate, six related plural nouns, your favourite colour, your favourite poet, the name of an ex, choose from one of three possible titles and press the You Oughta Submit button, it creates an Alanis song just for you.

Our song, called 'I think', could easily be mistaken for an Alanis song if sung in the right Canadian whine. The second verse seems to refer to *Planet of the Apes*: "I think neutrons are gonna drive us all crazy/And electrons make me feel like a child/I think monkeys will eventually be the downfall of civilization/But what can you do? I said what can you do?" The chorus, however, is just plain silly: "Like a red rain, beating down on me/Like a Shakespeare line, which won't let go of my brain/Like Alanis Morissette's ass, it is in my head/Blame it on physics [rpt]".

It seems *APC*'s writers aren't about to be replaced by typing monkeys or recursive grammars any time soon. Whether you're writing an essay on the gender politics of Shakespeare or just trying to express some Alanis-style faux pain, you're still going to have to do it yourself.

- **The Postmodernism Generator**
  http://www.csse.monash.edu.au/cgi-bin/postmodern/
- **Alan Sokal**
  http://www.physics.nyu.edu/faculty/sokal/
- **Alanis Morissette Lyric Generator**
  http://www.brunching.com/toys/toy-alanislyrics.html

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Chip Chat

For many years, Chip Chat has had the comfortable impression that *APC* readers are generally a nice bunch of people with technical expertise, sunny dispositions and occasionally healthy diets. Recently, however, a disturbingly large percentage of *APC* readers have been exposed as sicko filthmonger freaks seeking gratuitous pleasures of a digital variety.

The source of this revelation is an article, 'Porn to be rich', published in our January edition this year. It examines the widespread assumption that people who run adult sites make enormous amounts of money, and discovered that they do. One Web developer claimed to be making $800,000 a year, and he wasn't even "generating his own content" (now there's a euphemism ripe for deconstruction).

Since the day this article first hit the streets, *APC* has been bombarded with requests for more information. In particular, loads of people have been asking for more details about the Webmaster interviewed in the article, "just so I can check out his site and see how it works".

There are two possible explanations for this phenomenon:

(1) Some people are so desperate for online porn that they'll do anything — up to and including emailing their favourite tech magazine — to find new sources.

(2) Some people are so desperate for money that they'll do anything — up to and including running an adult Web site — to find new sources.

Although the profusion of 'lose weight now' schemes might suggest otherwise, we initially found it hard to believe that hundreds of Australians are that keen to get that rich. Nonetheless, we have the emails and the piles of letters to prove it. If we could convince Pocketbooks editor Ashton Mills to publish a *Porn Pocketbook*, we suspect that it would do rather well. However, Ashton has standards, so we've shelved that idea.

Since *APC* exists to serve its readers, Chip Chat is proud to fill the breach with some handy hints for budding adult Webmasters. Well, not really proud; we're still slightly appalled, but we're doing it anyway.

Tip 1 Your readers are patient people and have time on their hands (among other things). If your page takes 20 minutes to download, it doesn't really matter.

Tip 2 Historically, celebrity nudes have proved popular. However, this is unlikely to be the case with politicians, TV chefs, Ray Martin or cast members of *Breakers*.

Tip 3 For good representation in search engines, give your page an excessively long title, entirely in capital letters, featuring any word that someone might vaguely be looking for. For instance: SEX XXX PURE FILTH ADULT PORN RAVING NYMPHOS BANANAS.

Tip 4 Selling pictures taken from other sites is a blatant violation of copyright. Don't get caught.

Tip 5 Australian law will soon require R-rated sites to have an age verification mechanism. Using the words 'Don't click here if you're under 18' probably won't do.

So, there you have it. Take this advice (perhaps with a pinch of salt), and you'll be running a successful adult Web site in no time. But don't tell us how it went.■

Contest: Technology gag of the month

Chip Chat's specially assembled prize packs are clearly becoming highly coveted items, judging by the volume of mail we receive. A handy tip: we have an irrational bias against top 10 lists. This month's winner comes from Marco Botros and will infuriate Apple lovers everywhere:

I was just having a conversation with someone who is about to buy a Mac. I was against it and an argument started. I said there are too few application developers building products for the Mac. He responded: "When was the last time you heard of a virus on a Mac?" And I said: "See? Even people who write viruses don't support Macs."

Marco will soon be the proud owner of a Kidz.net T-shirt, a packet of Maxfli golf balls and a copy of Corel's Web.Graphics suite. You too can be part of the select *APC* gagging team. Send your technology jokes — the shorter and funnier the better — to chipchat@acp.com.au. If we publish your joke, you'll win specially selected items from the *APC* prize cupboard.

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